

Scanning - Shortwave - Ham Radio  
Equipment - Computers



# Monitoring Times

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# The Shuttle Returns to Flight

*Also in this issue:*

Islands On The Air

Ham Radio's Digital Modes

The ICOM 746PRO as a Communications Receiver

Monitoring Transoceanic Flights



# AOR SR2000 Frequency Monitor

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**The SR2000 is an ultra-fast spectrum display monitor with a high quality triple-conversion receiver**

**AOR puts the power of FFT (Fast Fourier Transform) algorithms to work in tandem with a powerful receiver covering 25 MHz ~ 3 GHz continuous.**

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– Scans 10 MHz in as little as 0.2 seconds!  
Instantly detects, captures and displays transmitted signals.

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**Standard Accessories:**  
AC adapter, control cables



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**Check out this remarkable receiver at [www.winradio.com/g3](http://www.winradio.com/g3)**



## Cover Story

### STS-114 - NASA's Return to Space

By Larry Van Horn

It's been a long two years since the shuttle's last, disastrous flight. All the intervening hard work to make future shuttle flights safer will shortly be put to the test as Discovery approaches the launch pad.

A lot has changed in NASA communications as well. Monitoring Times has been providing hobbyists with shuttle support frequencies ever since our inaugural issue, and we continue that tradition in this article. Also see this month's Utility World and Milcom columns. Story starts on page 10.

On Our Cover: Through the open doors of the Vehicle Assembly Building can be seen the second redesigned External Tank (ET-121). (NASA Photo)

## C O N T E N T S

### Every Island Tells a Story ..... 14 By Ken Reitz

Remote islands have always been a favorite target for amateur radio operators, but the sheer number of these entities and the countries that claim them is dizzying. The Islands On The Air (IOTA) society organized the chaos and turned island DXing into a fine art which any radio hobbyist can enjoy.

From Antarctica to the tiniest tip of a volcano poking out of the ocean, we'll take you island hopping via radio to some of the most popular Islands On The Air.

### The Digital Ham Revolution ..... 17 By Larry Van Horn

No one who loves radio is unaware of the digital revolution that has been taking place in communications and even in broadcasting. Ham radio operators – always on the cutting edge of new technology – have had their impact in this field as well. Personal computers have made digital communications accessible to any ham, but some modes have proven more popular than others.

As we trace the evolution of digital technology in radio, we'll look at the various modes, what you need to get on the digital bandwagon, and some website links for further exploration.

## Reviews:

Why would you buy a ham radio just for its receiver? Well, why not? Our review of the receiver side of **Icom's IC-746PRO** proves you can get generous features and excellent quality at a price competitive with communications-grade receivers. (See page 70.)

Bob Grove says, "Next to a good receiver, a spectrum analyzer is the most valuable piece of test equipment that a serious monitor of the radio spectrum can own." Following a discussion of the difference between spectrum analyzers and oscilloscopes, Bob puts the new **AVCOM PSA-37XP** spectrum analyzer to the test (page 69).

Because he knows from experience how much hard work and sacrifice goes into creating software programs, John Catalano hesitated before pitching hundreds of old disks into the trash. Were any of these **old DOS programs** still viable in today's Windows environment? Turn to page 72 to see whether any programs survived their brief reprieve!

Poles apart from DOS programs in sophistication is **PC Frequency Manager** from IfS, which includes everything from databases to propagation prediction to receiver control. The first of two parts appears on page 31.



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# RE-INVENTING RADIO

Through\_Innovation



## S350

AM/FM Shortwave radio

**High-performance field radio - \$100\***

- Aeronautical design with rugged body
- Excellent AM, FM, & Shortwave reception
- Line-level input, separate bass, treble
- External antenna input
- Wide/narrow bandwidth filter controls
- Alarm and sleep timer functions

Dimensions: 10.8"L x 8"H x 3.5"W Weight: 3lbs.  
2oz. Power Source: 4 D batteries (not included) or  
AC adaptor (included)

## YB550PE

AM/FM Shortwave radio - \$100\*

**Digital marvel**

- Shortwave range of 1711 – 29,995 KHz
- Autoscan, direct keypad, and scroll wheel tuning
- 200 customizable station presets
- Alarm and sleep timer functions
- AC adaptor and supplementary antenna inputs

Dimensions: 3.5"L x 5.8"H x 1.4"W Weight: 11oz.  
Power Source: 3 AA batteries (included)



## G2000A

AM/FM Shortwave radio by F.A. Porsche

**Timeless Porsche style - \$80\***

- Autoscan and direct keypad tuning
- 20 programmable station presets
- Dual alarm and sleep timer functions
- Snap-on protective leather case that converts to stand

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Power Source: 3 AA batteries (not included) or AC adaptor  
(not included)



\*Prices do not include Shipping/Handling and applicable taxes. To order please call us toll free at 1-800-793-6542

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## Through\_Necessity



### FR300

AM/FM radio with NOAA, TV-VHF, flashlight, and cell phone charger - \$50\*

#### All-in-one self-powered weather alert radio

- "Weather Alert" plus all 7 NOAA weather channels
- TV-VHF channels 2-13
- Hand-Crank Power Generator
- Built-in Cell Phone Charger
- Built-in flashlight and emergency siren
- Inputs for AC adaptor and earphones

Dimensions: 6.7"L x 6.5"H x 2.5"W Weight: 1lbs. 5oz.  
Power Source: Hand-Crank Power Generator with rechargeable battery pack, 3 AA batteries (not included) or AC adaptor (not included)



### FR250

AM/FM Shortwave Radio & Cell Phone Charger - \$50\*

#### Self-powered radio and flashlight

- Receives 7 international bands
- Hand-Crank Power Generator
- Built-in Cell Phone Charger
- Built-in flashlight and emergency siren
- Inputs for AC adaptor and earphones
- Rugged splash-proof ABS body

Dimensions: 6.7"L x 6.5"H x 2.5"W Weight: 1lbs. 5oz.  
Power Source: Hand-Crank Power Generator with rechargeable battery pack, 3 AA batteries (not included) or AC adaptor (not included)



### FR200

AM/FM Shortwave radio and flashlight - \$40\*

#### Emergency crank radio

- Hand-Crank Power Generator
- Built-in flashlight
- 7 International Shortwave bands
- Perfect for camping, hiking, and everyday use

6 colors: Metallic Red, Metallic Blue, Metallic Pearl, Metallic Bronze, Yellow, and Sand.



### FR100

AM/FM radio and flashlight with blackout alert - \$30\*

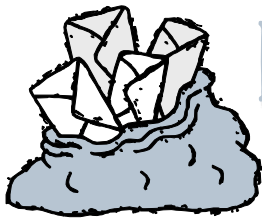
#### Plug-in radio with blackout alert

- Just unplug it for bright light and an AM/FM radio
- Plugs into the wall for continuous charging
- Illuminates automatically during a power failure
- Rechargeable Ni-MH battery (included) lasts up to 16 hours for LED light or up to 8 hours of radio use



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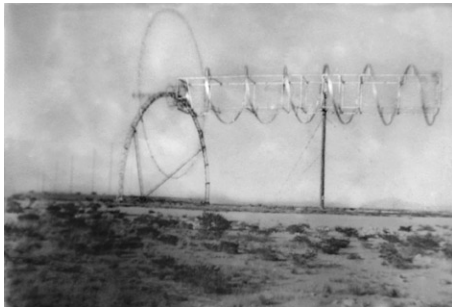
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# LETTERS TO THE EDITOR

## Mystery Antenna

"...the picture of the large helical antenna on the 'Letters' page of October 2004 *MT* submitted by Jesse Wadsworth, WA6CQE, is believed to be the work of the Late Oliver Swan. This particular antenna was used for long-distance reception of TV signals for local cable systems.



"Oliver Swan owned an antenna company (c. 1970) located in Stockton, CA, and manufactured antennas for television and amateur use. This could very well be one of Mr. Swan's creations."

— Roger Pience N1XP, Maine

Roger is the only reader to come up with a specific idea of this antenna photographed in 1968 west of Roswell, NM. If anyone has anything more definitive, he'd welcome additional information. Meanwhile, we thank Roger for coming up with a reasonable answer to a mystery antenna that had most of our readers stumped.

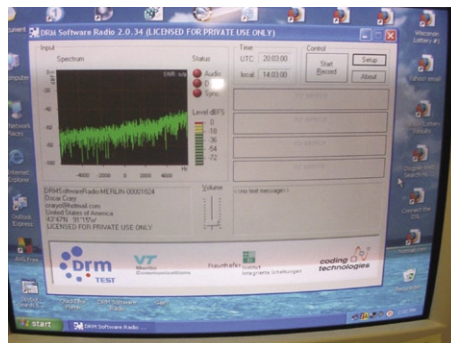
## Two Views on DRM

"I became an SWL at the age of 14 ... I am now the ripe old age of 56 and would like to comment on Digital Radio Mondiale.

"I have bought the DRM software to listen to this new form of broadcasting on shortwave. So far every DRM broadcast has been well away from the others broadcasting DRM. I would like to see two broadcasting side by side within the 10 MHz scale to see how much interference they give each other. I would like to see two broadcasting on the same freq. and let's see what happens. I think it is time to have a ground swell of SWL start sending letters to the FCC and all the governments involved with the broadcasting



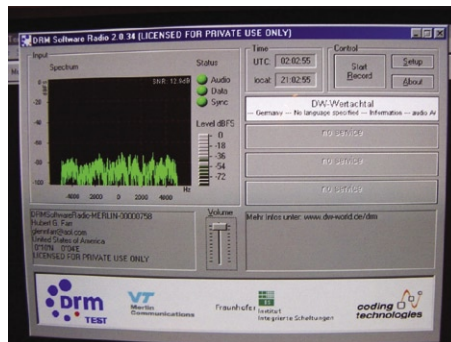
of DRM. I think it is time to tell them what we think and that this is not going to work but only to kill the hobby.



"With DRM we will no longer be able to listen to weak stations. DRM drops out when the signal is weak or it bounces, so what good is it? DRM signal is dropped more than it is [audible]. Gone will be the days of listening to faint signals. All that will be left will be the sound of coffee grinders, drowning out everything around them. I have listened to signals from Bonaire, Neth. Antilles, Canada's worthless splatter Sackville (there should be a law ...), Kuwait, Luxembourg... As you can tell by now I do not believe that DRM is the savior of shortwave.

"Sorry, I believe just the opposite. DRM will be the end of shortwave as it is now. All you're going to have is sporadic signals, and coffee grinder noise and interference on a scale as never before. I say, put DRM in its own band or set frequency and keep it there. And if they can live up to what they promise, then we can think about letting them move to other frequencies. Let's face the facts: the only ones benefiting are the salesmen and companies selling the DRM equipment to broadcast this crap. Let's also face the fact that a lot of the struggling and small watt stations low on money to change over to DRM will just give up and stop broadcasting. Has anyone stopped to think what does that do for shortwave? That means everyone loses."

— Oscar Crary, Holmen, Wisconsin



"Thanks for a great publication! Several months ago you ran a series of articles on DRM

and really got me interested in this new technology. I have been listening to DRM from the Canadian station in Sackville for several months now. Tonight I received the station from Wertachtal, Germany, on 3995 kHz. As you can see from the screen photo of the software program, I have all 'Green Lights' and am receiving the audio and data perfectly. The receiver is a Ten-Tec RX-320D and the antenna is a GAP Vertical Titan DX. I am sure a lot of amateur radio operators have been wondering what the 'noise' was on 3995!

"I [also] enjoyed Glenn Hauser's article on DRM in your February issue."

— Glenn Farr N4AK, Travelers Rest, SC

## Unauthorized Utilities in Ham Bands

"I would like to thank [Hugh Steman] for the August 2004 *Utility World* column about some of the intruders which are known to invade the exclusively-allocated Amateur Radio bands.

"Your article was well-researched and very balanced, and provided an excellent overview of the intruder problems facing Amateurs in many parts of the world today.

"It is a fact that many Amateurs are unaware of the sources of interference which they experience while DXing or ragchewing with their friends. Thank you for bringing this problem to the attention of your many readers.

"I have already alerted my colleagues in IARU (International Amateur Radio Union) to your article and I will make brief mention of the article in my next issue of the IARU Region 2 Monitoring System Newsletter so that others will learn of it also."

— Martin H. Potter VE3OAT

## Kaito WRx911

"Please pass on my thanks to Eric Bryan for his review (October 2004). After reading it I was prompted to buy one. I found one at <http://surpluscomputers.com>, a Yahoo Store, for \$15.99 plus \$7.00 shipping. It arrived in a little over a week and is working as advertised. I am not sure it's worth \$30.00 but it is certainly worth \$15.99, which means the Chinese are probably selling it to the American retailers for less than \$10.00."

— Martin Gallas, Jacksonville, IL

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, 7540 Highway 64 West, Brasstown, NC 28902, or email [editor@monitoringtimes.com](mailto:editor@monitoringtimes.com). Letters may be edited for length and clarity. Happy monitoring!

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**1,000 Channels • 27 bands • CTCSS/DCS • S Meter**  
Size: 6<sup>5/16</sup>" Wide x 6<sup>3/16</sup>" Deep x 2<sup>3/8</sup>" High

New Product. Scheduled for initial release January 10, 2003. Order now.  
Frequency Coverage: 25.0000-512.0000 MHz., 806.000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.000, 1240.000-1300.000 MHz.

When you buy your Bearcat 785D state-of-the-art Digital Capable TrunkTracker III package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC785D scanner purchase, you also get a **free deluxe scanner headset** designed for home or race track use. The Bearcat 785D has 1,000 channels and the widest frequency coverage of any Bearcat scanner ever. When you order the optional **BC125D, APCO Project 25 Digital Card** for \$299.95, when installed, you can monitor Public Safety Organizations who currently use conventional, trunked 3,600 baud and mixed mode APCO Project 25 systems. APCO project 25 is a modulation process where voice communications are converted into digital communications similar to digital mobile phones. You can also monitor Motorola, EDACS, EDACS SCAT, and EF Johnson systems. Many more features such as S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, operate your scanner from your computer running Windows. Order Scantail Gold for Windows, part number **SGFW** for \$99.95 and magnetic mount antenna part number **ANTMMBNC** for \$29.95. Not compatible with 9,600 baud APCO digital control channel with digital voice, AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at [www.usascan.com](http://www.usascan.com).

**Bearcat® 895XLT Trunk Tracker**  
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**300 Channels • 10 banks • Built-in CTCSS • S Meter**  
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Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box \$14.95; **MB001** Mobile mounting bracket \$14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. **CAT895** Computer serial cable \$29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.



### Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price \$429.95/CEI price **\$189.95**

**300 Channels • 10 banks • Trunk Scan and Scan Lists**  
**Trunk Lockout • Trunk Delay • Cloning Capability**  
**10 Priority Channels • Programmed Service Search**  
Size: 2<sup>1/2</sup>" Wide x 1<sup>3/4</sup>" Deep x 6" High

Frequency Coverage:  
29.000-54.000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

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Hear more action on your radio scanner today. Order on-line at [www.usascan.com](http://www.usascan.com) for quick delivery. For maximum scanning satisfaction, control your Bearcat 245XLT from your computer running Windows. Order Scantail Gold for Windows, part number **SGFW** for \$99.95 or the surveillance enhanced version with audio recording part number **SGFWSE** for \$159.95.

### More Radio Products

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Bearcat 895XLT 300 ch. TrunkTracker I base/mobile scanner.....	\$179.95
Bearcat 785D 1,000 channel TrunkTracker III base/mobile.....	\$339.95
Bearcat BC125D APCO Project 25 digital software card.....	\$299.95
Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner.....	\$139.95
Bearcat 250D 1,000 ch. TrunkTracker III handheld scanner.....	\$339.95
Bearcat 245XLT 300 ch. TrunkTracker II handheld scanner.....	\$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner.....	\$84.95
Bearcat Sportcat 200 alpha handheld sports scanner.....	\$159.95
Bearcat Sportcat 180B handheld sports scanner.....	\$139.95
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AOR AR16BQ Wide Band scanner with quick charger.....	\$199.95
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## SPACE

### Shuttle vs Soyuz

Although there have been only two astronauts manning the International Space Station since the US space shuttle has been grounded, they have occasionally found time to talk to school students around the world via the onboard amateur radio station. One recent contact was between the ISS and students from St John's School in Houston, Texas. One student asked Expedition 10 Commander Leroy Chiao, KE5BRW, about the differences between traveling into space aboard the Russian Soyuz vehicle and the US space shuttle.

Chiao explained, "The Russian rocket, because it doesn't use solid-rocket boosters, is actually much smoother. It's liquid engines the whole time and just feels a little bit different ... Also, because it's a missile ... the actual trajectory is a little bit different than of the shuttle, so we actually pull a few more Gs." Even so, both take the same amount of time to get into space – about eight and a half minutes, Chiao said. For more information on amateur radio contacts with the space station, go to <http://www.arrrl.org/ariss>

## FCC

### Martin to Lead FCC

The White House has picked Kevin J. Martin to succeed the agency's outgoing chairman, Michael K. Powell. Martin does not require Senate confirmation because he already is a commission member. Indications are that Martin will continue the FCC's more stringent enforcement of indecency regulations and may be more open to concerns about interference from broadband over power lines (BPL).

One Republican seat is open on the five-member commission, but the third Republican commissioner, Kathleen Q. Abernathy, may also choose to step down later this year. Democratic commissioner Jonathan S. Adelstein was recently reappointed to a five-year term; Democrat Michael J. Copps' term expires in June but may be renominated.

### Software Radios Reined In

The Federal Communications Commission issued an order to prevent software-defined radios from being modified by users to affect the RF operating program and keep the technology in line with FCC rules, specifically frequency restrictions in the United States.

The FCC is afraid that possible software modifications to a programmable radio could make it too easy to violate the spectrum restrictions and cause interference.

Active efforts are currently underway both in industry forums and standards bodies to adopt internationally accepted standards for software defined and cognitive radios.

### Software Radios Hit Snag

In January, the Defense Department told Boeing, the Joint Tactical Radio System's prime contractor, to put a hold on development of the software radio system in favor of refining work already done in preparation for an 18-day test in April of "Cluster 1" – three five-channel ground/vehicular JTRS radios, one seven-channel tactical air control party radio, and the JTRS software communications architecture and information assurance features. Analysis and evaluation of the test results in August will help determine the ultimate fate of the JTRS program.

The JTRS project is behind schedule and over budget, while troops in the field need more immediate delivery. DOD officials had planned to replace 750,000 tactical radios with 180,000 software-defined radios, which could operate in battlefield environments and across a wide swath of the radio frequency spectrum.

"Evolving security requirements, known design changes and extended formal testing have added cost and schedule to the program," Army officials said in a statement.

This marks a sharp reversal of fortune for JTRS, which was hailed by Pentagon officials in 2002 as a "transformational" program that would underpin an interconnected "network-centric" military force.

## AMATEUR RADIO

### Military Appreciation Day

Last year on Memorial Day, Emery McClendon KB9IBW and several other local hams in Fort Wayne, Indiana, set up operations outside Memorial Stadium during a Fort Wayne Wizards baseball game to enable people to talk with US soldiers at military bases in the US and overseas. Amateur Radio Military Appreciation Day (ARMAD) was initiated last year by Emery McClendon, a former aircraft refueler. It is held on Memorial Day weekend in conjunction with National Military Appreciation Month.

McClendon organized ARMAD "to encourage amateurs worldwide to use our hobby to express thanks as a public service for those that serve in the military, including active duty, veterans and retirees."

At this year's event on May 28, activity is expected to increase exponentially, following exposure on the "America Supports You" website. "Last year, we had more than 25 different groups in the U.S. and about 15 foreign countries participating in ARMAD," McClendon noted. "We expect participation to triple for the 2005 event." For current information on how to participate, go to the event site at <http://www.freewebs.com/kb9ibw/>

### Islands on the Air

In the list of rare, remote DX islands, such as those mentioned in this month's feature article, are the Navassa and Desecho Islands. Representative Nick Rahall (D-W.Va.) has introduced Bill H.R. 298 into the 109th Congress, with co-sponsorship

by Representative Richard Pombo (R-Calif.). This bill requires the U.S. Fish and Wildlife Service to allow public access to the islands, which would open the door to Amateur Radio expeditions. The KP1/5 Project Team in conjunction with the Lone Star DX Association asks your help to ensure passage of this Bill in the House of Representatives by contacting your representative to encourage him or her to support H.R. 298. For more information visit <http://www.KP1-5.com>

### Hamvention Awards

Dayton Hamvention's 2005 Amateur of the Year is Alan S. Kaul, W6RCL, of La Canada, California. Hamvention is recognizing Kaul for his ongoing dedication to educating radio amateurs about the many facets of ham radio and to publicizing Amateur Radio through the media. Kaul is a West Coast Producer for *NBC Nightly News*.

This year's Dayton Hamvention Technical Excellence Award winner is Jerry Seveck, W2FMI, of Basking Ridge, New Jersey. Seveck is well-known in ham radio technical circles for his many publications on such topics as baluns and ununs and vertical antennas and he also serves as an ARRL technical advisor.

The recipient of the Dayton Hamvention Special Achievement Award is D. Bharathi Prasad, VU2RBI, whose work in organizing the DXpedition to the Andaman and Nicobar Islands and subsequent emergency communication efforts in response to the December tsunami have already been lauded in *MT*.

## OTHER NEWS

### ANARC to Be Disbanded

At the Winter SWL fest in Kulpville, PA, March 12, members of the Association of North American Radio Clubs (ANARC) board and club representatives met and, in a unanimous vote, felt that the time had come for the dissolution of ANARC. The report sent to member clubs by Dr. Harold Cones expressed the consensus that ANARC's only useful function is to operate a club promotional web site. Since not all clubs were present, a grace period was allowed for votes from clubs not represented before the decision becomes final.

Recognizing that the web site is a valuable tool for North American radio clubs, the intent is to continue its operation with funding from the North American Short Wave Association (NASWA) and the Winter Fest. All radio clubs, not just former ANARC members, will be encouraged to establish a listing on the web site at no charge.

ANARC's annual Don Jensen Distinguished Service Award (given this year to Rich D'Angelo), will continue under the new name of The North American Radio Clubs Distinguished Service Award, and will be open to outstanding hobbyists from all wavelengths.

### Radio Rumors

A number of shortwave radios have recently



**TJ Skip Arey signs a copy of his "Radio Monitoring" book for Kevin Carey at Winterfest 2005. Both are columnists for Monitoring Times and gave presentations at the 'Fest.**

gone out of production. These include the Icom IC-R75, PCR-1000, blocked versions of the IC-8500 and IC-R10, and the Drake R8B. Many of the models are still available through distributors. The AOR 7030PLUS is no longer available from AOR

USA, but can still be purchased from the UK. The only dedicated shortwave desktop receiver now left in the marketplace is the JRC NRD-545.

The new, intriguing Grundig E1XM radio was expected to be available by presstime.

## BBC World Service Cuts

According to the BBC web site, starting March 27, there will be adjustments to the BBC World Service shortwave schedules "to reflect global changes in audiences' use of short wave."

The number of hours broadcast on shortwave in English and Spanish to Central and South America and the Caribbean will be reduced to two daily blocks in the early morning and evening. The shortwave service to Brazil in Portuguese will cease altogether.

Shortwave in English to Europe will be reduced to two daily blocks in the early morning and evening. There will be no Arabic Service overnight broadcasts to the Middle East from 2300 GMT to 0200 GMT.

No changes were reported to broadcasts to Africa, Asia, or Afghanistan.

*"Communications" is compiled by editor Rachel Baughn KE4OPD, from news clippings provided by our readers. Thanks to this month's fine reporters: Anonymous, Azizul Alam Al-Almin, Harold Cones, Norman Hill, Jonathan Kammen, Allen Lutins, Sterling Marcher, Ken Reitz, Doug Robertson, Doug Smith, Robert Thomas II, Larry Van Horn, Peter Vieth, Ed Yearly, George Zeller*

## EQUIPMENT BARGAINS GALORE IN BOB'S BARGAIN BIN!

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# STS-114 – NASA's Return to Space

By Larry Van Horn, N5FPW

It has been a little over two years since that dark Saturday in January of 2003, when the Space Shuttle *Columbia* broke up upon reentry over the southern United States. This tragic accident resulted in the loss of the seven STS-107 crew members and the shuttle orbiter they were flying in.

During the intervening period, the National Aeronautics and Space Administration (NASA) has been through an extensive accident investigation, a rigorous internal audit of how the agency does business, and a redesign of some of the key shuttle systems that contributed to the loss of the *Columbia*.

When the crew members of the Space Shuttle *Discovery* lift off late this month from NASA's John F. Kennedy Space Center, Florida, they'll be supported by two years of hard work by tens of thousands of people determined to make the space shuttle safer. NASA has upgraded flight hardware, as well as visual tracking and inspection equipment, to ensure that mission STS-114, the "Return to Flight," is successful.

## Results of the Accident Investigation

The *Columbia* accident revealed a major problem with the insulating foam that cov-

ers the rust colored external tank. Investigators found that foam falling off the tank during the launch phase of the STS-107 mission had damaged *Columbia*'s left wing, letting superheated gases inside during the reentry phase of the mission. Redesigning the external tank became a top priority in the Agency's "Return to Flight" work. NASA engineers have made dozens of changes to the tank design in the ensuing months since the accident.

Another major safety improvement to the space shuttle fleet is the expanded use of enhanced imaging equipment to record the launch of *Discovery* as it roars into the sky and glides through space.

At Kennedy Space Center, NASA has upgraded the short-, medium-, and long-range tracking camera systems around the Center's launch pads 39A and 39B, along with those lining the nearby Atlantic coastline. The addition of nine more camera sites will provide unprecedented views of *Discovery*'s launch, allowing engineers to clearly observe the flight high into the sky.

The shuttle fleet and launch hardware also received new imaging equipment with the installation of a digital external tank camera and new "Canadarm" inspection boom.

Making the most of current consumer photography equipment, the orbiter's external tank camera has been switched from film to a digital model. Located in the rear underbelly of the orbiter, the camera is similar to a standard 35-mm model and snaps a series of photos as the tank separates from the orbiter. With the previous film camera, flight engineers had to wait until the shuttle landed to retrieve



*Through the open doors of the Vehicle Assembly Building can be seen the second redesigned External Tank (ET-121). (NASA Photo)*

the negatives and develop photos. With the simplicity and increased speed of a digital system, the image files will be easily transmitted back to Earth shortly after a shuttle reaches space.

Once in orbit, the visual inspection of the orbiter will continue with the help of a new piece of robotic technology. During the STS-114 mission, the "Canadarm" located inside *Discovery*'s payload bay now includes the Canadian-built Orbiter Boom Sensor System. The boom extension houses a camera and laser-powered measuring device that astronauts will use to scan the orbiter's exterior. The boom attaches to the end of the existing robotic arm and doubles its length to 100 feet long. The extra length will allow the arm to reach around the spacecraft for the best possible views. With the new boom, astronauts will take a good look at features like the orbiter's leading wing edges, which are now closely watched by an advanced monitoring system.

Each shuttle orbiter's leading wing edges are outfitted with 22 temperature sensors to measure how heat is distributed across their spans. Both wings also have 66 accelerometers apiece to detect impacts and gauge their strength and location. The sensors are highly sensitive and take 20,000 readings per second. This new network of sensors running along the wings provides an electronic nervous system that gives engineers a valuable way to monitor their condition.



*The newly redesigned external tank slowly moves toward the Vehicle Assembly Building, seen at right. The tank arrived at KSC after a 900-mile sea voyage aboard NASA's specially designed barge, Pegasus, from the Michoud Assembly Facility in New Orleans. (NASA Photo)*

Inspection of the wings will continue once an orbiter returns to Earth. Technicians will use a proven method called flash thermography to examine the Reinforced Carbon-Carbon panels that make up the wing's leading edges. The technique starts by applying an intensely hot and bright burst of light to the panels. Technicians then survey the panels with a heat-sensitive infrared camera to see if any flaws appear under stress from the extreme heat. Flash thermography will reveal even small imperfections and offer technicians a powerful tool for keeping an orbiter's wings in shipshape condition.

## Return to Flight from KSC

*Discovery* will start its return to space from launch pad 39B at the Kennedy Center sometime during a launch window that runs from May 15 to June 3, 2005. It will carry a crew of seven: Commander Eileen Collins, Pilot James Kelly, and Mission Specialists Charles Camarda, Wendy Lawrence, Soichi Noguchi, Steve Robinson and Andy Thomas.

*Discovery's* crew will fly to the International Space Station primarily to test and evaluate new procedures for flight safety, shuttle inspections and repair techniques.

## Shuttle Launch Operations

Situated on the edge of Florida's east coast, Kennedy Space Center is the only facility in the world that launches the space shuttle.

Kennedy prepares the vehicles for each mission, operates each countdown and manages end-of-mission landing recovery activities. The Center also coordinates all expendable vehicle launches carrying a NASA payload, whether the launches take place at Cape Canaveral Air Force Station in Florida, Vandenberg Air Force Base in California, or elsewhere. Finally, as the last Earthly stop for International Space Station hardware, Kennedy prepares these elements for their missions in space.

In addition to space shuttle processing and launching, Kennedy is also NASA's preferred end-of-mission landing site for the space shuttle orbiter. Part of the Center's Landing Recovery Team – which leads the effort to safeguard the orbiter and aid the crew as they exit the vehicle – is on hand at backup landing sites around the world.

## Monitoring the Launch and Landing of STS-114

Old timers will remember that in volume one, number one of *Monitoring Times*, we presented one of the most complete lists of space shuttle frequencies then in the public domain. In subsequent issues of *MT* and our former sister publication *Satellite Times*, we updated that original list first published in 1982.

In keeping with that tradition, we have included in this article a portion of our exhaustive online NASA Frequency List which is available on the *Monitoring Times* website in the MT Reference Library. The NASA Fre-

quency List has extensive information and frequencies on NASA facilities worldwide and much more. You can find that complete list at: <http://www.monitoringtimes.com/nasa.html>.

## KSC and Moto

There have been significant changes in the communications systems at KSC and other areas support facilities since the last shuttle launch in January 2003. NASA has now fully installed their new Motorola Smartzone 3600-baud APCO-25 mixed mode trunk system. This five-site system handles the bulk of the Center's wireless voice communications and supports the Kennedy Space Center Integrated Communications System (KICS).

Here are the particulars of the system you can use to program your digital, trunk capable scanner:

System: Motorola Smartzone ASTRO 3600 baud (APCO 25 Mixed mode)  
Motorola System ID: 0a28  
Base Frequency: Base Frequency: 406.000 MHz, Spacing: 12.5-kHz; Offset: 380

### Site 1: Kennedy Space Center Main

Two simulcast remote locations: 500 foot Weather Tower (remote 1) and Communications Shop Tower (remote 2)  
Frequencies (12 channels): 406.2375c 406.375c 406.4375c 406.6375c 406.8375 407.0375 407.2375 407.8375 408.0375 408.4375 408.6375 409.025

### Site 2: Northern Kennedy Space Center

Location: Shiloh Tower  
Frequencies (3 channels): 406.175 409.425 409.6375

### Site 3: Cape Canaveral AFS

Location: Timing Tower  
Frequencies (10 channels): 406.5625c 406.9625c 407.7625c 408.1625c 408.5625 408.9625 409.3625 409.7625 410.1625 410.5625

### Site 4: Patrick AFB

Location: Microwave Tower  
Frequencies (8 channels): 407.9625c 408.3625c 408.7625c 409.1625c 409.5625 409.9625 410.3625 410.7625

### Site 5: Malabar Annex

Location: Unidentified Tower  
Frequencies (3 channels): 406.3625c 406.7625c 407.1625c

Table One has a list of trunk system talkgroups reported to us by our field reporters. The list is the most comprehensive record of talkgroup identifications yet published. It is accurate as of presstime and we encourage our readers to check our online article mentioned above for any later updates to talkgroups and frequencies monitored by our field team.

At KSC and the Cape there are primary



An overall view of activity in the Shuttle (White) Flight Control Room as flight controllers participate in a long-duration simulation for the STS-114 mission. (NASA Photo)

nets that are directly related to the launch of a space shuttle or expendable rocket. These are hotbeds of radio activity and will aid the radio hobbyist in following the progress of the launch. We have included our latest list of these nets in Table Two.

Of course, there are many more frequencies along the Space Coast that should be monitored during any space launch. We do not have the room here to publish all of them in this article. Again, the best place to get updates and the complete list is on the *MT* website at the URL listed above.

If you are able to make it to the launch of STS-114 and you monitor anything new not on our list, we would like to hear from you. We appreciate any updates you may have and will publish them to the free online article on the website. You can reach us at: [larryvanhorn@monitoringtimes.com](mailto:larryvanhorn@monitoringtimes.com).

On launch day, when the shuttle's boosters erupt with fiery thrust and shake the Florida sands, that moment will signal the culmination of more than two years of thoughtful planning and hard work. America's flagship spacecraft will once again streak back into space on a mission to the world's most unique research platform, the International Space Station. It's a mission that promises to begin with a safe and exciting reach for the sky and end with an even happier landing.

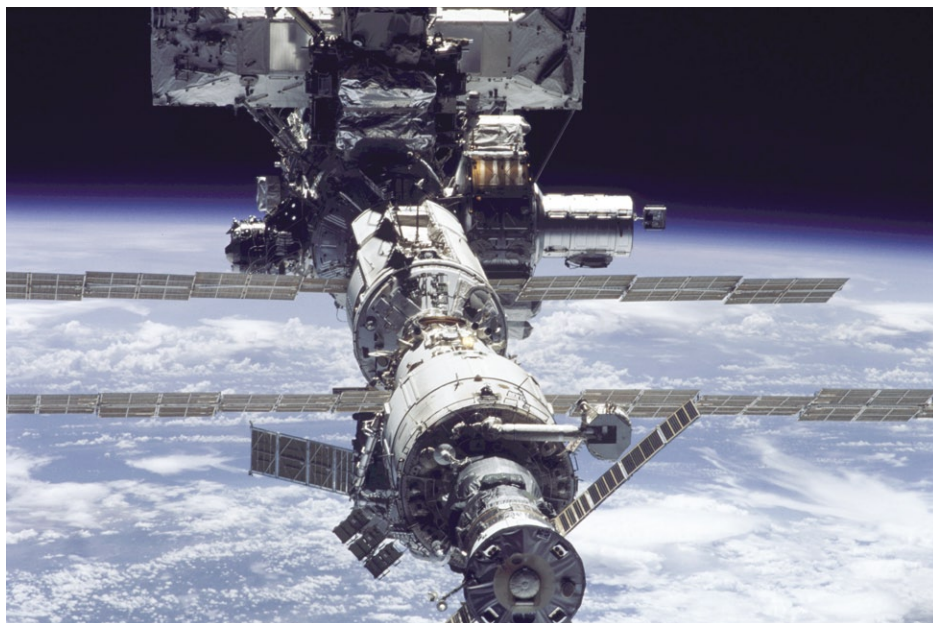
## Table One: Kennedy Space Center Trunk System Talkgroups

Legend:  
CCAFS .. Cape Canaveral Air Force Station  
KSC ..... Kennedy Space Center  
PAFB ..... Patrick Air Force Base

### Talkgroup Usage

208	Merritt Island National Wildlife Refuge: US Fish & Wildlife (Patched/link from 165.450 MHz)
272	Merritt Island National Wildlife Refuge: US Fish & Wildlife (Patched/link from 165.450 MHz)
336	KSC Facility Operations Net <Net 107> [ex-170.150 MHz patch]
416	KSC Facility Operations Net Channel 3
480	KSC Unknown usage <Net 207>





*The International Space Station (ISS) is viewed from the Space Shuttle Endeavour following the undocking of the two spacecraft over western Kazakhstan. (NASA Photo)*

18112	CCAFS Metrics/Optics Net "Metrics ##"	34256	PAFB Explosive Ordnance Disposal (EOD) Teams "EOD Control, EOD Base, EOD 1" [ex-163.375]
18144	CCAFS Launch Control Center (LCC) Timing "LCC/Timing ##"	34560	PAFB Unknown user/usage
18192	CCAFS Weather Net "Weather Base/Weather #" [ex-165.0375]	34576	PAFB Civil Engineers Dispatch "CE Control" Channel 1 [ex-171.3875]
18256	CCAFS Unknown user/usage "PC Base/FS3"	34592	PAFB Civil Engineers Electricians Channel 2
18272	CCAFS Unknown user/usage "PC Base/PC6/FS3"	34608	PAFB Civil Engineers Channel 3
18608	CCAFS Unknown user/usage	34624	PAFB Civil Engineers Channel 4
18624	CCAFS Alarm Net	34640	PAFB Civil Engineers Alarm Technicians Channel 5
18672	CCAFS Unknown user/usage	34864	PAFB Unknown user/usage
19664	CCAFS Unknown user/usage	34896	PAFB Supply/Ground Freight "COSO, Ramp 4" [ex-149.265]
20176	CCAFS Unknown user/usage "test counts"	34912	PAFB Cargo Deployment Function (CDF)
20208	CCAFS Utilities "Ready Base" [ex-150.250]	34928	PAFB Fuels (POL) "Control" [ex-165.1625]
20496	CCAFS Unknown user/usage "test counts"	34944	PAFB Munitions Operations
20512	CCAFS Unknown user/usage	35216	PAFB Unknown user/usage
20528	CCAFS Unknown user/usage	35536	PAFB Unknown user/usage "test counts" (secure communications)
20544	CCAFS Unknown user/usage (secure communications)	35552	PAFB Special Events Net (clear and secure communications)
32336	PAFB Law Enforcement Dispatch Channel 1 (clear and secure communications) [ex-173.025]	35568	PAFB ET Net (Exercise/Training)
32352	PAFB Law Enforcement TAC 2 (clear and secure communications)	35856	PAFB Tower/Ramp Control [ex-173.125]
32368	PAFB Unknown user/usage	35984	PAFB Runway Operations
32384	PAFB Unknown user/usage	36496	PAFB Deployment Control Center (DCC) (clear and secure communications)
32476	PAFB Civil Engineers "CE##"		
32592	PAFB Unknown user/usage (secure communications)	36512	PAFB 920th RQW Maintenance Operations Control (MOC) [ex-149.300] (some secure communications) or the PAFB Mission Operation Support Center (MOSC)
32656	PAFB Fire/Rescue/Crash Dispatch Channel 1 "Fire Control" [ex-164.700]		PAFB Deployment Control Center (DCC)
32672	PAFB Fire/Rescue/Crash TAC 2	36544	PAFB Medical Control Center (MCC)
32688	PAFB Fire/Rescue/Crash TAC 3		
32976	PAFB Base Operations	36560	PAFB Unknown user/usage
33296	PAFB Unknown user/usage		
33344	PAFB Unknown user/usage (secure communications)	36816	PAFB Unknown user/usage
33360	PAFB Unknown user/usage	36832	PAFB Unknown user/usage
33936	PAFB Medical (clear and secure communications)	37776	PAFB Command Net "Reef/Shark #/Shark Control"
33952	PAFB Unknown user/usage "Gator Control" (clear and secure communications)	38144	PAFB Base Transportation "Dispatch/Mobile 1"
33968	PAFB Medical Control Center (MCC) (clear and secure communications)	38736	PAFB Unknown user/usage
		41616	PAFB Unknown user/usage
		41648	PAFB Unknown user/usage (secure communications)

**Table Two:**

## Space Launch Ground Networks

Shuttle Launch Nets Trunk System Talkgroups and Conventional Frequencies			Net	Talkgroup	Usage (Conventional Frequency)
101	14096	Utility Maintenance Net (Civil Engineers/Utilities/Parking Control) (171.000)			
102	6800	Telemetric/Measurements/Safety			
103	1936	Security (Law Enforcement/Patrol)			
104	12496	Launch Support Operations (162.6125)			
105	1616	Launch Pad 39 Safety (173.6625)			
106		Supply (170.400)			
107	336	Base Operations			
108	9936	Paging/PAO/Hurricane Operations			
110	1648	Orbiter Operations (165.4125)			
111		Administration: Loan Pool (173.5375)			
116	976	Fire/Rescue Dispatch			
117	1296	Medical Services Net			
201	5776	General Maintenance (170.150)			
202	11600	Shuttle Landing Facility Landing Systems (MSBLS/Telemetry) (165.6125)			
203	1952	Security [Tactical 2] (173.150)			
205	1680	Orbiter Processing Facility (OPF) Safety Secondary (173.4625)			
206	13136	Transportation (Truck)/Railroad Operations (170.150)			
207	480	Unknown user			
216	1136	Fire Rescue (Tactical)			
301	14526	Utility Maintenance Net (Electrical) (173.6375)			
306		Marine Operations/Transportation (162.0125)			
308		Base Voice Paging System (170.350)			
400	496	KSC/CCAFS Security			
408	13776	Camera Recording Coordination Net			
500	10576	Cargo Operations/Payloads (413.250 UHF-5)			
600	10608	Cargo Operations Net (413.375 UHF-6)			

## Cape Canaveral/Eastern Test Range Net Trunk System Talkgroups and Conventional Frequencies

Net	Talkgroup	Usage/Frequency
Net 1		Canaveral Port Control 2716.0 kHz (USB)
Net 6		Cape Radio 5211.0 kHz (USB)
Net 7		Cape radio 5246.0 kHz (USB)
Net 8		Cape Radio 3041.0 kHz (USB)
Net B	1760	Safety
Net B2	1776	Safety
Net B3	1792	Safety/Security
Net C	16976	Utilities
Net D		CCAFS Security
Net G	6736	Photo/Timing
Net H		Flight Caution Area (FCA) Net (163.5875)
Net I	18048	Communications Security (COMSEC)
Net Y	5392	Environmental Health
Net Z	1952	Security

# Every Island Tells a Story

By Ken Reitz KS4ZR

**W**hen most of us see the word *island* we think of the palm tree studded jewels of the Caribbean Sea: the jade green waters rushing up to the sugar white beaches which seem to go on forever. But islands come in an amazing variety. In fact, the planet is peppered with islands ranging from the naked, rocky ramparts of the North Atlantic to the trembling tips of volcanoes in the South Pacific.

Each island has a history, a story of trade and conflict, as stepping stones on the paths of discovery across the vast oceans. Often they are tagged with exotic names reflecting their colonial heritage, such as Curacao (Portuguese), Pantelleria (Italian), and Ile Europa (a French island thousands of miles away from Europe). Sometimes they retain their original names from seemingly mystic dialects unpronounceable to English speakers.

## The Radio Link

It was the invention of radio which abruptly drew these remote archipelagoes into the world fold. With the advent of shortwave broadcasting, news of the world could be heard instantaneously around the world in dozens of languages. Then the ingenuity of amateur radio operators turned radio communications into a two-way event, allowing tens of thousands into the homes of those tiny island nations.

In some cases – the West African island of Sao Tome, for example – the two communications services are combined. The Voice of America has a transmitter site on Sao Tome which downlinks programming via satellite and broadcasts to Africa from there. One of the engineers on Sao Tome is a ham who is active on the ham bands as S9SS.

Another example is Diego Garcia, an island in the Chagos Archipelago in the heart of the Indian Ocean, thousands of miles from any land mass in any direction and home to a number of military bases. One very active ham on Diego Garcia is VQ9LA, who is heard on nearly every mode and band.

Other islands have become wildlife refuges after hundreds of years of human occupation. One example is Isla de Aves (Bird Island), a tiny island in the Caribbean. Another is Socorro Island off Mexico's Pacific coast. These islands have been returned to their natural state and are

accessible only under naval escort from their respective countries.

## Islands On The Air

As you might have imagined, there is an organization devoted to keeping track of the various islands of the world for amateur radio purposes. Their task is to assign a number to each and to promote amateur radio activity on them. Part of the Radio Society of Great Britain (RSGB), Islands On The Air (known by its acronym IOTA), publishes a directory of the program and issues the rules and regulations for all amateur activities on the world's islands. Details can be found at their web site: <http://www.rsgbiota.org>. Here you'll also find details on the nearly innumerable awards offered in the IOTA program.

The IOTA program was created in 1964 by Britain's leading shortwave listener Geoff Watts and it was made part of the RSGB in 1985. Today, shortwave listeners are still encouraged to tune into DXpeditions and to send their reception reports for colorful QSL cards. Tuning in the hams from these islands and receiving their QSL cards turns a daydream into a lesson in geography and world history. Here is a sample of a few of the popular Islands On The Air.

### Antigua

This is the quintessential image of a Caribbean island. Antigua was home to a large indigenous population when Columbus landed here in 1493. Unimpressed by the great explorer, these people fiercely resisted Spanish attempts to conquer them. They fought hard against colonial rule for nearly 150 years and were eventually overcome by the British. Antigua once more became an independent state in 1981. Antigua is IOTA NA-100.



### Antarctica

Not only a continent unto itself, Antarctica is home to countless islands and the ubiquitous penguin. The rim of Antarctica is partitioned into bases for all participating countries and their scientific expeditions. Many of the scientists are also hams who sometimes take time off from their research to work the rest of the world. The 20, 15 and 10 meter bands are the most popular for these operators, but propagation to the bottom of the planet is not often favorable. This particular QSL is from Galindez Island (IOTA AN-006) and the operator Paul (home call UX2HO) is from the Ukraine.



### Aves Island

(Isla de Aves or Bird Island)

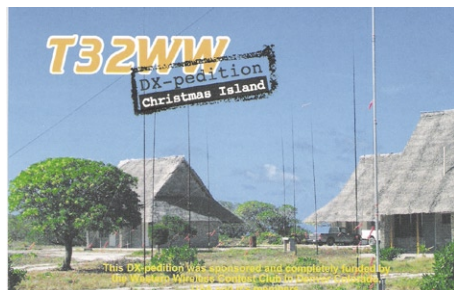
This tiny island in the Caribbean is claimed by Venezuela and has been a wildlife refuge since 1972. It is now inhabited by turtles, migratory birds and a scientific station. The island is so small there's no room for anything else. Since 1956 the Radio Club Venezolano has organized 12 expeditions to Aves, some timed to celebrate anniversaries of the RCV. The YV0D call sign was given to commemorate the 70<sup>th</sup> anniversary of RCV. The intended two-week DXpedition was cut to a mere 57 hours by one of many hurricanes ravaging the Caribbean in 2004. Since access to



the island is done only with a Venezuelan naval escort, the hams had to leave the island. They were very active while there, making 18,449 total contacts. Some also worked the naval transport on the way to Aves under the call sign YV5AJ/MM. Aves Island is IOTA NA-020.

## Christmas Island/ Kiribati

Kiribati is a group of three islands (West, Central and East Kiribati) in Micronesia and is found near the crossroads of two completely imaginary boundaries: the equator and the international date line. Kiribati presents several DX entity opportunities: West Kiribati (T30), Central Kiribati (T31) and East Kiribati (T32) IOTA OC-024 which is also known as Christmas Island. World War II activity here included the battle of Tarawa in which 5,000 U.S. Marines landed to take a heavily fortified Japanese installation. After just three days six thousand combatants from both sides were dead. Australia lays claim to a Christmas Island with the VK9X (IOTA OC 002) prefix, which is just south of Indonesia and thousands of miles away from Kiribati. It's easy to get them confused.

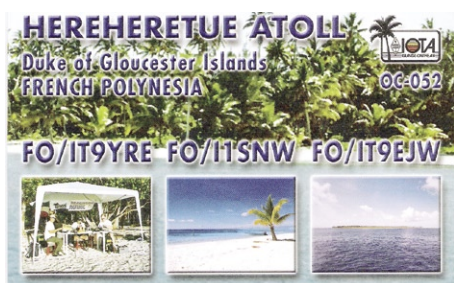


## Cyprus

Turkey and Greece have both claimed this island and the physical partition is an unfriendly one, complete with a barbed-wire-strewn no-man's-land and regular international incidents. The division is primarily due to religious differences between Greek Orthodox Cypriots and Turkish Cypriots who are Muslims. Since there's no end in sight to this predicament, the International Telecommunications Union (ITU) allows two call sign prefixes: ZC and 5B. Cyprus is IOTA AS-004.

## French Polynesia

Tiny dots of land from a series of archipelagos include Tahiti (FO), the main island, and five groups of islands including Duke of Gloucester Islands (FO), Marquesas Islands (FO0), the Austrel Islands and more. Clipperton Island (also FO0), an uninhabited atoll actually off the southwest coast of Mexico is also



considered part of French Polynesia. Keeping track of the call signs from every little atoll in French Polynesia is a nightmare of bookkeeping for active DX chasers. This QSL card was from the Hereheretue Atoll (IOTA OC-052), part of the Duke of Gloucester Islands.

## Ile Europa

Located in the Mozambique channel, Ile Europa lies between the east coast of Africa and the west coast of Madagascar. Long a refuge for pirates plying their trade off the coast of Africa, Ile Europa is now the site of a meteorological station which is staffed by members of the French navy. Plagued year 'round by mosquitoes, the island is the natural habitat for turtles and migratory birds. Occasionally, DXpeditions are allowed on the island, which always generates intense activity despite the fact that the call sign prefix TO qualifies only as a French call sign and not a separate DXCC entity. Ile Europa is IOTA AF-009.



## Isle of Man

Carrying the British call sign prefix of GT, the Isle of Man (IOTA EU116) is a singular rock formation right in the middle of the Irish Sea with Scotland due north, Ireland due west, England due east and Wales just to the southwest. It claims a 10,000 year history of habitation with its own currency, stamps and capital. With easy access by sea from all directions, it's easy to imagine the intrigue of thousands of years of boats sailing a criss-cross pattern from England to Ireland, Scotland to Wales back and forth. It's IOTA EU-116

## Martinique

Caught in a tug-of-war between France and Great Britain during the 1800s, this beautiful island is decidedly French. Martinique was

the birthplace of Napoleon's Josephine and, like many Caribbean islands, has been the site of some volcanic activity. Mt. Pelee erupted in 1902 and destroyed the island's biggest city. The island sports the FM call sign prefix and is IOTA NA-107.



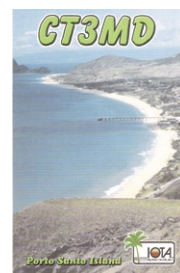
## Montserrat

This beautiful island was known as "The Emerald of the Caribbean" until July 2003 when the Soufriere Hills volcano erupted. The DXpedition to Montserrat, which had been scheduled months in advance, went ahead anyway. From the VP2MVU QSL card: "The villa we operated from was only 3 miles from the volcano and was covered with about 2 inches of gray ash... This made for an interesting time setting up antennas and radios..." Montserrat is also often devastated by hurricanes and is IOTA NA-103.



## Pantelleria Island

Calling itself "African Italy" Pantelleria is an Italian island so close to Africa that on a clear day the coast of Tunisia can easily be seen. Occupied through the ages by Phoenicians, Greeks and



## DX Windows

These frequencies are known as "DX Windows" and should be reserved for DX (foreign to U.S.) stations. Even though the frequency may appear to be unoccupied at your location, there may be a DX station operating which you can't hear. So, to be on the safe side, stay off the DX frequencies unless you're actually working a DX station on it. There are also unofficial, but still honored, IOTA frequencies on some bands. Look for IOTA stations and DXpeditions here as well.

Band	Frequency	Notes
160 meters	1830-1850	CW and SSB DX window.
80 meters	3790-3800	SSB only. IOTA SSB: 3755 CW: 3530.
40 meters	7000-7035	CW. No SSB DX window but DX is often found split.
30 meters	Limited to non-phone modes only. No DX specific window. IOTA: 10.115	
20 meters	14.195	SSB DX window. Main IOTA SSB frequency is 14.260. CW: 14.040.
17 meters	No specific DX window. IOTA SSB: 18.128, CW: 18.098.	
15 meters	21.295	SSB DX window. IOTA SSB: 21.260, CW: 21.040.
12 meters	No specific DX window. IOTA SSB: 24.950, CW: 24.920	
10 meters	No specific DX window but SSB DX often between 28.400-500. FM simplex calling frequency is 26.600. IOTA CW: 28.040	

Romans (among others), this island of volcanic origin saw its peak in population in 1950 at just over 10,000. There are now around 7,000 inhabitants. Pantelleria Island is IOTA AF-018.

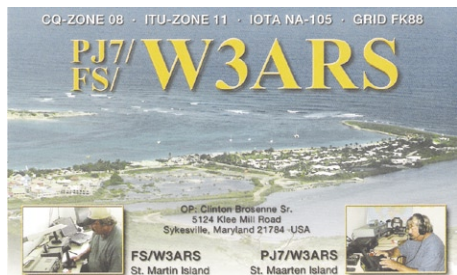
### Porto Santo Island

One of the islands in the Madeira Archipelago, Porto Santo is credited as being the first stepping stone on the route of the great period of discovery. It is said that Porto Santo was discovered by Portuguese sailors in 1418 when their ship was blown there by a fierce storm. About 5,000 people live on this rocky island, now an extinct volcano with very little vegetation. Porto Santo is IOTA AF-014



### Rotuma

The Rotuma Island group consists of one large volcanic island surrounded by eight smaller islands. Though occupied for hundreds, if not thousands of years by natives of the South Pacific, it was "discovered" by a British naval party in 1791 who were attempting to find the mutineers from *HMS Bounty*. Of course, they didn't find them on Rotuma, but the island soon became a popular haven for sailors on the run and escapees from Australia's penal colonies. Rotuma is IOTA OC-060.



### St. Martin/St. Maarten Island

It's easy to get confused about this island. It carries two amateur radio prefixes: FS and PJ. If you are familiar with call sign prefixes, you know that an "F" indicates French assignment and "P" indicates Dutch assignment. That's the story of this island. Said to be the smallest island ever to be divided by two countries, it's been shared peacefully by the French and Dutch for 350 years. The highest point on the island is Pic Paradis at 1,400 feet above sea level. St. Martin/Maarten is IOTA NA-105.



### Socorro Island

Socorro is one of four volcanic islands in the Revillagigedo archipelago. In 1994 it was declared a "biosphere reserve" for scientists who study the habitat of the Socorro parakeet and dove, among other birds native to the archipelago. It also hosts a small Mexican naval base which was established in 1954. Since its discovery in 1533 it had been inhabited by an assortment of people ranging from sheep farmers to pirates. It has an active volcano which last saw action in 1848. Socorro Island is IOTA NA-030.

### QSLing the Islands

Most DXpeditions to the islands are happy to verify reception reports from shortwave listeners, but you'll have to observe the same rules which apply to hams trying to verify a two-way contact. These rules are normally posted on the DXpedition's web site or a designated verification call sign announced on frequency and found on <http://www.qrz.com>.

Some will QSL only via the route specified on-air. Others will QSL "via the bureau" which means that you may send your report through your outgoing QSL bureau (see <http://www.arrl.org/qsibureau>).

Here you'll also find specific rules for the size of your reception report so pay attention to that as well. It's very useful to mention the radio you were using and antenna along with your name and location. If you are sending your verification direct (not through the bureau) you must include a self-addressed envelope (SAE) and \$2 (U.S.) in order to receive your QSL card through the mail. If you don't do these two things your card will be sent via the bureau which could take one to two years to receive.

Some DXpeditions are annual affairs but others are rare. Some are mounted by active DX clubs such as Northern California DX Foundation which raises money to launch DXpeditions to different parts of the world each year. Some DXpeditions are privately funded. They are often just a couple of friends who are all hams and want to travel. But, doing this takes a lot more effort than just remembering to pack your radio gear as you get on the plane. Most countries require application for a local amateur call long in advance of your arrival. There is usually a fee involved and you have to observe your host countries' amateur radio rules and regulations. There may be restrictions on operating (frequencies, radios, antennas etc.) and you'll have to be familiar with all relevant rules.

### IOTA/DX On-line Sources:

Current information on DXpeditions to islands is critical. It's necessary to scan the various web sites regularly for literally up-to-the minute news of where operations are taking place. Here are three vital web site where you can find this information:

<http://www.rsgbiota.org/index>

IOTA main web site. Everything you need to know about IOTA is here, including which islands are currently active or will be in the near future.

<http://www.425dxn.org/>

Has a weekly newsletter which covers all current DXpeditions, where they're located, where to send QSLs and other pertinent information.

<http://oh2aq.kolumbus.com/dxs>

DX spotter's page. Lists DX stations, their frequencies and bands currently on-air. Page updates every three minutes.

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every issue!**







**AOR ARD9800 Digital Voice/Image Modem**  
radio circuit. Use of PACTOR-III protocol is limited for U.S. hams and some other countries, due to the very wide bandwidth of the transmit signal. Presently, digital signals that occupy the bandwidth of PACTOR-III are restricted to a few ham subbands. Only the embedded hardware (modem) from the German company that owns the rights to this mode is capable of operating Pactor-III.

**Clover**, introduced by the HAL Communications Corporation in 1993, was one of the first HF digital modes to use sophisticated data coding, coupled with a complex modulation scheme and DSP technology. The promise of Clover was great performance, but that came at a stiff price that few could afford. Because of this, hams have not embraced this mode as quickly as some others and it sees little use in the ham bands today.

**G-TOR** or Golay-TOR is an FSK mode that offers a fast transfer rate compared to PACTOR. It incorporates a data inter-leaving system that assists in minimizing the effects of atmospheric noise and has the ability to fix garbled data. G-TOR tries to perform all transmissions at 300 baud, but it drops to 200 baud if difficulties are encountered. If conditions are especially poor, the speed can drop to a low 100 baud. This protocol was devised by M. Golay. G-TOR is found in only one manufacturer's terminal node controller (TNC) and is rarely used today in the ham bands.

### PSK31 Changes Everything

In 1999, this mode burst on the ham radio scene thanks to Peter Martinez, G3PLX, who invented it. (He is also responsible for AMTOR.) PSK31 is the high-octane cousin of radio teletype. Getting on the air using the PSK31 mode is pure simplicity. It uses the computer sound card as an interface to the transceiver. There is also an easily constructed interface used to key the transmit function. If your skills with the soldering iron are a bit rusty, there are several companies who offer inexpensive transceiver interfaces.

PSK31 combines the advantages of a simple variable length text code with a narrow bandwidth phase-shift keying (PSK) signal using DSP techniques. This mode is designed for "real time" keyboard operation, and the 31 baud rate is fast enough to keep up with the typical amateur typist. Most ASCII characters are supported.

A second version with four (quad) phase shifts (QPSK) is available that provides Forward Error Correction (FEC) at the cost of reduced Signal to Noise ratio.

What helped this mode achieve the popularity it enjoys on today's ham bands is that Martinez made the software available for free over the internet – equivalent to throwing a match on gasoline. Within a few short months

following articles in *QST* and other ham magazines, PSK31 became the number one HF digital mode for casual conversation, contesting, and DXing in the HF spectrum.

It has also led to other more significant advances in sound card software and new digital modes.

### The Hell Modes

Hellschreiber is not a new mode (having been pioneered in the 1920s and '30s by Robert Hell). But now that we have DSP technology via computer sound cards, hams have been discovering this old mode all over again.

Unlike most of the other modes we have discussed in this article, Hellschreiber is a visual mode that paints text on your screen like television or facsimile, as opposed to being decoded and printed. It is also known by hams as the "fuzzy" mode.

The single-tone version (Feld-Hell) is the most popular Hell mode, and it is a favorite with low power (QRP) amateur operators. Feld-Hell is an on/off keyed system with 122.5 dots/second, or about a 35 wpm text rate, with a narrow bandwidth (about 75 Hz).

In addition to the Feld-Hell mode, there are two other "fuzzy" modes hams have found to be useful and are currently using. PSK Hell and FM Hell modes both come in a 105 baud and 245 baud rate. With these modes, the on/off keying needed to paint the Hell characters across the marquee are sent by shifting the phase of two tones (PSK Hell) or by shifting the frequency of one tone (FM Hell).

The faster baud rate for both modes does not increase text speed, but it does increase resolution, producing a sharper font. Both modes have a 100% duty cycle during transmit, but the additional power will produce a less



**AOR USA donated two ARD9800 digital modem units to Maxim Memorial Station W1AW. AOR USA Executive Vice President Taka Nakayama, KW6I, visited W1AW and ARRL Headquarters to present the ARD9800 units. Accepting on behalf of ARRL was W1AW Station Manager Joe Carcia, NJ1Q. (Photo courtesy of AORUSA)**

noisy background, making the text easier to read.

### MT63

MT63 is a new DSP based mode for sending keyboard text over paths that experience fading and interference from other signals. It is accomplished by a complex scheme to encode text in a matrix of 64 tones over time and frequency. This overkill method provides a "cushion" of error correction at the receiving end while still providing a 100 wpm rate. The wide bandwidth (1 kHz for the standard method) makes this mode less desirable on crowded ham bands such as 20 meters. A fast PC (166 MHz or faster) is needed to use all functions of this mode.

### THROB

Yet another new DSP sound card mode called THROB attempts to use Fast Fourier

**Table One: Digital and Digital Voice Interfaces**

AOR ARD9800 Digital Modem	<a href="http://www.aorusa.com/main.html">http://www.aorusa.com/main.html</a>
Ham Radio Solution (Interfaces)	<a href="http://www.hamradiosolutions.com/site/">http://www.hamradiosolutions.com/site/</a>
MFJ Enterprises (Interfaces)	<a href="http://mfjenterprises.com">http://mfjenterprises.com</a>
Saratoga Amateur Radio Products (Interfaces)	<a href="http://www.saratogaham.com/">http://www.saratogaham.com/</a>
TigerTronics (Interfaces)	<a href="http://www.tigertronics.com">http://www.tigertronics.com</a>
Timewave Technologies (Interfaces)	<a href="http://www.timewave.com">http://www.timewave.com</a>
West Mountain Radio (Interfaces)	<a href="http://www.westmountainradio.com/">http://www.westmountainradio.com/</a>

**Table Two: Digital Modes Websites**

ARRL Digital Voice Webpage	<a href="http://www.arrl.org/tis/info/digivoice.html">http://www.arrl.org/tis/info/digivoice.html</a>
Digital Modes Online Sounds	<a href="http://rover.wiesbaden.netsurf.de/~signals/DIG_intro.htm">http://rover.wiesbaden.netsurf.de/~signals/DIG_intro.htm</a>
Digital Voice on HF (Charles Brain, G4GUO)	<a href="http://www.chbrain.dircon.co.uk/dvhf.html">http://www.chbrain.dircon.co.uk/dvhf.html</a>
DRM and Ham Radio	<a href="http://www.owdjim.gen.nz/chris/radio/DRM/">http://www.owdjim.gen.nz/chris/radio/DRM/</a>
G3VFP Software and digital interfaces	<a href="http://www.g3vfp.org/index1.html">http://www.g3vfp.org/index1.html</a>
NB6Z Digital mode website	<a href="http://home.teleport.com/~nb6z/">http://home.teleport.com/~nb6z/</a>
PSK31 Official Homepage	<a href="http://aintel.bi.edu.es/psk31.html">http://aintel.bi.edu.es/psk31.html</a>
Sound Card Interfacing by W5BBR	<a href="http://www.w5bbr.com/soundbd.html">http://www.w5bbr.com/soundbd.html</a>
WSJT Homepage	<a href="http://pulsar.princeton.edu/~joe/K1JT/">http://pulsar.princeton.edu/~joe/K1JT/</a>
WUN Club Digital Sounds Online	<a href="http://www.wunclub.com/sounds/">http://www.wunclub.com/sounds/</a>

Transform technology (as used by waterfall displays) to decode a five tone signal. The THROB program is an attempt to push DSP into the area where other methods fail (because of sensitivity or propagation difficulties) and at the same time work at a reasonable speed. The text speed is slower than other modes, but the author, L.G. Sear, G3PPT, has been improving his MFSK (Multiple Frequency Shift Keying) program.

### MFSK16 Appears in 1999

Another sound-card-related program, known as Stream, appeared on the heels of PSK31 in 1999 and was used to decode still another new ham digital mode – MFSK16. This mode is an advancement to the THROB mode (above) and encodes 16 tones. The software was developed by Nino Porcino, IZ8BLY, and uses its 16 multiple tones to overcome the many problems of HF propagation, such as fading. These signals are easily recognizable by their musical sounds. Utility digital enthusiasts will recognize MFSK16, as it was derived from the musical Piccolo mode.

### VHF/UHF Digital Modes

The VHF/UHF crowd has not been sitting idly by watching the HF community have all the digital fun. One acronym that is very familiar to that community is WSJT – the name of a computer program which stands for Weak Signal communication, by K1JT.

The program currently supports four principal modes:

- **FSK441**, designed to support communication using very brief “pings” from meteor trails in the ionosphere.
- **JT6M**, also for meteor scatter, but especially optimized for the 6-meter band.
- **JT65**, ideal for extremely weak, but slowly varying signals such as those found on troposcatter and Earth-Moon-Earth (EME) paths.
- **EME Echo** mode is used for detecting and measuring your own echoes from the moon.

The WSJT uses state of the art digital techniques and the computer sound card for decoding and DSP functions. It can decode fraction-of-a-second signals reflected from meteor trails, as well as steady signals more than 10 dB weaker than those required for conventional CW.

### Modems are the Key

In order to demodulate the incoming digital signals received by your transceiver, you will need a modem to decode the digital



### MFJ-1275 Soundcard Interface

stream into intelligence. You can do RTTY on the cheap with a handful of parts if you want to roll your own. Manufacturers have also jumped on the bandwagon for the construction-challenged. MFJ Enterprises in Starkville, Mississippi, makes several inexpensive RTTY modems.

If you want to run more than just RTTY and want to jump on the computer sound card bandwagon, companies such as MFJ, West Mountain Radio, TigerTronics and Saratoga Amateur Radio products have commercial computer-to-transceiver interfaces to help get you started. All you will need then is to select your software and you are ready to get on the air.



### Saratoga EZPSKUSB

Table One of this article lists the contact information for the most popular computer-transceiver interface manufacturers and Table Two is a list of reference websites worth visiting to learn more about the digital modes of amateur radio.



### Tigertronics Singalink SL1

I would also suggest you get a copy of an article written by Del Schier, K1UHF, published in the October 2003 issue of *QST* magazine, called *The Ins and Outs of a Sound Card*. Del's article will help start you on the road to using the computer sound card and the new host of digital sound card modes being used in amateur radio.

When it comes to researching software options for the sound card, there is one website that stands head and shoulders above the rest. Dr. Oliver Welp, DL9QJ, has a website with links to all the major amateur radio sound blaster software packages available for download on the internet. You can view this valuable reference site at <http://www.muenster.de/~welp/sb.htm>

### The Future

One new area that is being extensively explored in the digital HF world of ham radio is digital voice communications. In fact, a major manufacturer, AOR, recently introduced the first digital voice/image modem for ham rigs. The ARD-9800 lets the ham send and decode digital voice signals and images in the HF ham bands. It uses a protocol developed by Charles Brain, G4GUO.

There is also experimentation being conducted on ham digital voice communications using the DRM protocol that is used by International Shortwave Broadcasters.

So, when we look back at what has happened over the last seven years in the ham bands, and then look ahead at further advancements in computer and DSP technology, the future of digital ham radio is a bright one. While analog communications will continue to reign supreme for some time to come, there is a quiet revolution taking place in the ham bands. Just like the move from AM to FM and Single Side Band, communications and ham radio are gradually shifting toward their future environment – the world of digital communications.

So are you ready to join the revolution, the digital ham revolution? It's never been easier to jump on the digital bandwagon and get in on some of the fun.

### News from Winterfest

Kulpsville, PA, March 10-11, 2005. approximately 200 of the faithful gathered from near and far to celebrate the 18th edition of the of Winter SWL Festival. Forums and displays cover the gamut from longwave to satellite. One afternoon session joined Bob Zanotti (formerly of Radio Switzerland International) and Ian McFarland (retired from Radio Canada International) in a look back and a look forward. Bob's new pages, “Switzerland in Sound” (<http://www.switzerlandinsound.com>), has almost become the defacto English-language site of the country.

Plan ahead now! The 19th ‘fest is scheduled for March 3 and 4, 2006. And the big number 20 – two decades – will be on March 9 and 20, 2007! As always, the Web site <http://swlfest.com/> tells all.

- Tom Sundstrom W2XQ, Baudwalking



### West Mountain RIGblasters

## Ham Antennas for Small Budgets and Space

Here's nothing like leafing through the pages of amateur radio catalogs to dampen the enthusiasm beginning hams have for the hobby. Sure, who wouldn't like to have an 80 foot tower and a couple of stacked Log Periodic antennas? But, who can afford even the cable for such an enterprise, let alone the massive rotator, installation costs, etc.?

Most of the several hundred thousand hams in this country live on small suburban lots, in townhouse style apartments or other places with antenna restrictions. And most find the radio hobby way down the line in budget priorities. So, what are the options for the majority of us wanting to get the most out of our limited space and money?

### ❖ Use What You've Got

Most of us started our ham interests from years of shortwave listening (SWL). So, maybe you have a long wire antenna already in place which you used to tune in the HF bands. It might actually work as an all-band ham antenna with the aid of an antenna tuner. Most new transceivers have built-in tuners which can make virtually anything work as an antenna. True, it may not be the most efficient antenna and the auto-tuners usually drop the power down as the Standing Wave Ratio (SWR) goes up, but it might work and not cost an extra dime!

If you've just purchased an older rig without the built-in tuner, you'll need to buy a tuner. That's not a bad investment to start out in the hobby, because most tuners serve multiple duty as a dummy load, SWR/power meter and multi-antenna switch, allowing connections to two coax-fed antennas, a balanced line (ladder line feed) or long wire. A good example is the MFJ-949E (see photo) which, at \$149.95, is one of the best buys in ham radio gear.

Start out with very low power (1 to 5 watts) in a part of a band for which you're licensed, and make some on-air test transmissions (don't forget to ID). Now, tune to a place on the band where someone is calling CQ. Answer and see what happens. The signal report in reply will tell you all you need to know. If no one ever responds, you'll have to consider other options.

If you don't have HF privileges and want to get more boost from your handi-talkie (HT) on the local 2 meter repeater, consider using your scanner antenna for 2 meters. Most ground plane antennas used for scanners will work on



*One stop rig helper: The MFJ-949E is an SWR/Power meter, dummy load, and antenna selector in one. Lets you choose from up to two coax feeds, a random wire or balanced line fed antenna for \$149.95. (Courtesy MFJ Enterprises)*

2 meters. Don't forget to disconnect any other radios which might be attached to the antenna before you key up!

A small ground plane scanner antenna such as the Radio Shack model #20-176 can handle the output of an HT (usually .5 to 5 watts). And, using such an antenna may also make a big difference in trying to hit more distant repeaters or if you're in an area where the local repeater is hard to hit. This type of antenna is easily mounted in the attic if antenna restrictions are a problem where you live.

### ❖ The Multi-band Vertical

It's tough to put up a big wire antenna with limited room, so compromises have to be made. Why not put up a vertical antenna? New vertical antenna designs make it possible to have a decent antenna without an extensive radial wire counterpoise. That's a big plus for those of us with townhouse style living quarters. The Hy-gain HF vertical antenna model #DX-88 is an example of this popular design.

*This Hy-Gain multi-band vertical takes up very little space and gives excellent performance on a variety of bands. At 25-ft tall it gives you 80 through 10 meters and can take up to 1,500 watts. (Courtesy Hy-Gain)*

Covering 80 through 10 meters, the all-band vertical is a compromise and you shouldn't expect to compare its abilities with those of a Yagi beam antenna. But, there are some advantages for tight spaces: Self-supporting (no guy wires), able to handle high power (in excess of 1 kW) and installation is quick and uses only a few hand tools. The prices are fairly high for verticals (the DX-88 is \$370), but the performance is good, it takes up very little space and may be

the only antenna you'll ever need.

Too expensive for you? Why not roll your own vertical using wire construction? Many hams have made a mono-band (wire cut to the center frequency of a particular band) quarter wave vertical out of regular antenna wire. The antenna books have the specifics, but the basics are these: The length (L) is equal to 234 divided by the frequency in MHz. Using this formula, make the radiator (the vertical element that actually radiates the signal) the proper length for the band you want.

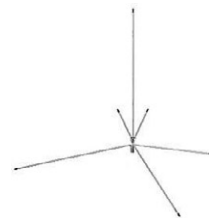
Now, cut radial wires the same length, and arrange them like spokes centering on the place where the radiator will be placed. Here's the rule of thumb on radials: the more in the ground the better the signal radiates. A hundred wouldn't be too many, but if all you can lay out is four, then go with that. Cut slits in the lawn about an inch or two deep with a hand trowel (I know, it's labor intensive) to lay the radials and cover them up. This ensures that they won't end up wrapped around your lawn mower!

Now take one end of your 50 ohm coax feed line and strip off the insulation. Cut a slit in the copper braid and pull the foam dielectric covered center conductor through. Strip off an inch or so of the foam and solder the center conductor to the vertical element and the braid to the place in the center of your ground radial "spokes." Of course, you'll have to support the radiator somehow with an insulated support, but I'll leave that to your imagination.

Run the coax into the shack, plug it into your tuner and give it the old "smoke" test. The tuner will help compensate for being slightly off and also allow you to try the antenna on other bands. Results may vary, but most will find that a home brew vertical cut for a lower frequency band such as 40 meters (7 MHz) may work very well on some of the higher frequency bands such as 10 meters (28 MHz). You'll just have to experiment!

One word of safety: Vertical antennas such as described here have a radiating element which

*This \$25 scanner antenna from Radio Shack makes a good outdoor or attic mount 2 meter antenna for your HT. Put a better signal into your local repeater or reach more distant repeaters. (Courtesy: Radio Shack)*



could come into contact with humans and other animals when you're transmitting, resulting in a nasty RF burn. So, be safe: mount the antenna in such a fashion as to prevent accidental contact. And, as with any antenna, you must pay attention to any power lines in the area. Before you start your installation make sure you know what's around you. You won't get any warning from a power line jolt.

## ❖ The Rotatable Dipole

A radiating element for a half-wave horizontal dipole at lower frequencies is huge. But, in the higher frequency bands, such as 12 and 10 meters, the element is quite manageable. What's more, it's small enough to mount on a mast turned by a common TV antenna rotator. You can make your own rotational dipole for 10 or 12 meters out of aluminum tubing you can find at your local hardware store. Look for various designs on this antenna in the antenna books and in *QST* magazine.



*The rotatable dipole has the edge on the wire version: can be placed high above ground on a TV mast rotator and can be rotated for better signal. This CushCraft D3 covers 10, 15 and 20 meter bands. (Courtesy: CushCraft)*

For an even cheaper and easier antenna, make the dipole out of wire and mount it on a 1" x 2" piece of wood fitted with an antenna mount. Solder one side of the dipole to the conductor of the coax feed and the other to the braided shield. Using the formula  $L=468/f$ , where  $L$  is the length which is equal to 468 divided by the frequency ( $f$ ) in MHz, you can determine the exact measurement for your favorite band.

Want something a little more versatile and substantial? CushCraft makes a multiband rotational dipole for the 10, 15 and 20 meter bands. The model D3 is 25.8 feet long, weighs 9 pounds and will take up to 2 kilowatts. A similar antenna, the D3W, is available for the WARC bands (30, 17, and 12 meters). Price for either is \$259.99. There is also a 40 meter dipole, which is just over 42 feet long and retails at \$319.99. There are other professionally made rotatable dipoles on the market at various prices and performance ability, so it pays to look around.



*Roll your own dipole with the help of a couple of HamStik antennas and this clever connector. The two HamStiks simply mount on the screw elements and the connector mounts on a mast. (Courtesy Antennawarehouse.com)*

I've talked to several hams on-air who have made their own semi-commercial rotatable dipoles by taking two HamStik® antennas and deploying them in a horizontal fashion with the lower ends towards each other. Antennawarehouse.com sells an inexpensive special connector to make this job even easier. You can make your own rotatable dipole for any band you want by selecting two matching HamStiks and the center connector. Add your own 50 ohm coax and you're ready for some DX action. Assembly couldn't be easier and you can break it down for taking on Field Day or camping trips.

## ❖ Attic Addict

The ultimate stealth antenna is one mounted in the attic. But, the problem has always been getting a good signal out. The best answer may be the PAR HF End-fedz line of antennas. Each antenna is designed to operate on one band. The longest in the line is the EF-20 for 20 meters which is only 33 feet in length. The EF-10 for 10 meters is only 16 feet long. That's short enough to fit in just about anyone's attic. Because these antennas are end-fed with 50 ohm coax cable, they are fairly quiet. And, the price is right, as all sell for under \$50. Read Larry Van Horn's review of the SWL version of this antenna on-line here: <http://www.monitoringtimes.com/html/mt2003reviews.html>. Read reviews of various transmitting versions at <http://www.e-ham.net>.

## ❖ Last Say

None of the antennas listed here will outperform a beam antenna on a tall tower. But, that's just the point. Most of us don't have the space or the money to be a "big gun." But, it doesn't mean we have to give up on the hobby, either. Try any of these cheap ways to get a signal out on the HF bands and have some fun. Note, too, that all of these antennas are made to order for PSK31 digital mode where low power is the order of the day, the bands are less crowded, and there's less competition from the guys with stacked arrays and kilowatt amps.

## Resources:

QST review of the D3W (ARRL members only): <http://www.arrl.org/members-only/prodrev/pdf/pr9010.pdf>

Find the PAR End-fedz line of mono-band antennas at Par Electronics Inc, PO Box 645, Glenville, NC 28736, 828-743-1338; <http://www.parelectronics.com/>

Antennawarehouse.com sells HamStik antennas and the connector to build your own rotatable dipole. The HamStiks are priced according to band. The center connector unit is \$18.95 plus \$6.20 S/H. For orders call: 877-584-5055. For product and shipping questions call 772-419-8359. Visit their web site at <http://www.antennawarehouse.com>

E-ham.com has a number of reviews on the subject of rotatable dipoles. Check them out at <http://www.e-ham.net>.

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## INFORMATION & ORDERING WWW.SCANCAT.COM

**Q.** I have an early-production scanner that can receive cellular frequencies. With the current laws forbidding the marketing of cellular-capable scanners, am I in danger of having this confiscated if I travel with it? (D.R., CA)

**A.** Any product which was FCC certified (and yours was), has not been unlawfully modified, and doesn't cause interference remains a lawful product in use and commerce. You should have no concerns about possessing it, using it (except for listening to phone calls!), traveling with it or advertising it for sale.

**Q.** I have an old scanner that has developed a hum through the speaker; what is the likely cause?

**A.** If the hum stays the same level with the volume turned down, it is either a bad filter capacitor in the power supply (most likely), or a shorted rectifier diode, also in the power supply (less likely). Filter caps contain an electrolytic chemical and are subject to drying out with time, thus losing their filtering ability. If the radio functions normally except for the hum, it's the capacitor, not the diode.

**Q.** I'd like to paint my antenna elements. Are some paints lossy to signals? (Steve Glover)

**A.** Yes, and this applies to plastics, rubber and other resins as well as radome covers. For example, some black pigments contain carbon, which is like a giant resistor, absorbing signals and dissipating them as heat; some white paints may contain metal particles which may interact with RF signal voltages. You can easily test these pigments, however, in a microwave oven.

Paint several test pigments as swatches on a piece of white paper, then let them dry thoroughly; you can coax them to dry with the microwave oven, but let them dry completely and cool down before actually testing them.

Once they are dry, microwave the paper test bed for about ten seconds; remove the paper and feel its temperature in comparison to the swatches. The highest heat will have the highest losses.

Sherwin Williams Polane® S Plus Polyurethane Enamel paint is recommended by some manufacturers.

**Q.** What makes the "whine" sound of a bullet ricochet? (Mark Burns, Terre Haute, IN)

**A.** The ricochet sound you hear in the movies is artificially produced; that's why so many of them sound the same. When a bullet leaves a muzzle, its symmetrical shape glides smoothly through the air molecules and you don't hear a whistle, but after it strikes a hard surface, it flattens on one side, making it irregular. The air passing by is destabilized by the irregularity, causing it to vibrate; the rate of vibration is the pitch of the sound. As the bullet slows down, its pitch lowers proportionately.

**Q.** I want to improve my pirate radio catches around 6.9 MHz with my Drake R8B receiver. I'm using a 150-ft longwire 20 feet above ground, made from common lamp cord including the lead-in. Will a "preselector/tuner" improve reception? How about cutting the antenna to a quarter-wavelength dipole? (John Morris, Whidbey Is., WA)

**A.** The R8B is one of the finest communications receivers ever made; it has excellent dynamic range, so it's unlikely – unless you have one or more local medium-wave broadcasters that are giving you an overload problem – that a preselector will give you much advantage. Concentrating on the antenna is a good idea.

Making the dipole a half wavelength (not quarter-wavelength) is theoretically an improvement since it's close to resonance and matches the receiver's design impedance; realistically, it probably won't make much difference, but it will be shorter and more pattern-predictable. This would be about 68 feet, fed at the center insulator with any kind of fresh coax, including inexpensive RG-58/U. The shielding on the coax will reduce electrical noise pickup from household appliances.

Elevating the dipole to 30 or more feet may help by lowering the main lobe of the antenna's pattern for more distant signal detection. Suspending it so that the broadside is toward Florida will give better nationwide coverage from Washington state.

**Q.** I have erected a longwave antenna consisting of two 250-ft

wires running out at an angle like a V. For best reception, should I connect their common feedpoint together, or isolate each leg and select them individually with a switch? (Herb Shatz)

**A.** I'd opt for the switch. Soldering them together will combine them into a single, broad element, while switching between them will permit you to choose the directivity which provides best signal with the lowest interference. At the lowest frequencies, the difference will be minimal; the higher you go in frequency, the more pronounced will be the difference.

**Q.** I live near an AM broadcaster, and several of my receivers hear splatter from that station all over the band when I connect a ground. What's the cause of this? (Jeffrey Muhr, Eugene, OR)

**A.** This almost certainly indicates that the combination of whip antenna plus ground is increasing the "aperture" – the signal gathering size – of your antenna system, overloading your receiver(s). Radios have a limited dynamic range (signal-strength-handling capacity) and when that is exceeded, the automatic gain control (AGC) circuitry fails along with the normally-linear amplification stages, developing spurious-signal products (intermodulation and images) throughout the tuning range.

This can be reduced or eliminated by:

- (1) Using a smaller antenna;
- (2) Disconnecting the ground;
- (3) Adding a notch filter tuned to the offending frequency to your antenna line;
- (4) Replacing your external antenna with a tuned loop like the Select-A-Tenna;
- (4) Sawing down the broadcaster's antenna;
- (5) Changing your hobby to bird watching;
- (5) Moving.

I'd suggest the first three!

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.) The current Ask Bob is now online at our website:

<http://www.monitoringtimes.com>

# Getting Started

## Bright Ideas

Gary Webbenhurst

P. O. Box 344, Colbert, WA 99005-0344  
garywebbenhurst@monitoringtimes.com

30

If you live anywhere near Ohio, you should plan on attending the Dayton Hamvention© (<http://www.hamvention.org/>) Celebrating their 54th show, **May 20, 21, & 22, 2005**, the hamvention is the world's largest amateur radio gathering and trade show. You need NOT be a licensed amateur; anyone who enjoys radio will treated to a great experience. There are always a lot of new radios and other products to inspect. Prices are rock bottom, and often justify the expense of attending.

Don't live in the upper Midwest? Check this website for other upcoming ham radio events: <http://www.arrl.org/>.

31

In the March 2005 column, I covered several ideas for maximizing your use of *Police Call* 2005. Readers Ward, Chris, and others emailed to say I overlooked the obvious: Why not copy the whole CD to a new folder on my hard drive and add a desktop shortcut? I did, and it is indeed faster, and more convenient. (Careful of the copyright license agreements.) I set up my *MT Anthology* series, the *Grove Military Frequency Directory*, and their *Federal Frequency Directory* as well. The good news is that this works very well: The bad news is that my hard drive is now pretty well filled. Time to optimize my hard drive!

Yeah, I know, many of you are running older PCs where your hard drive is measured in Megabytes, and not Gigabytes. As prices for new PCs (and hard drives) have plummeted, maybe the best bright idea is a new computer!

32

Wildland fire season approaches. The winter precipitation in the Spokane, Washington, area has been dismal. With only 0.04 inches for the month of February, it was the all-time driest February on record. We are expecting a very early and serious wildfire season. While I shudder to think of all the natural resources and private property that might be lost, I am prepared to spend several hours a day listening to the key fire frequencies.

Keep in mind that virtually all wildfire frequencies are VHF that any old scanner will receive. No fancy trunking or digital technology, with the exception that some new frequencies might be the new narrowband technology with 6.25 kHz spacing. Unfortunately, most scanners do not yet have this capability.

I use several different radios:

- One for the usual local fire frequencies, including the 153 and 154 MHz range, specifically 154.145-154.445.
- One for state forest conservation frequencies, usually in the 151 and 159 MHz allocations.
- One for Federal agencies
- One for aircraft frequencies

When using *Police Call* to search for state frequencies look for the "C" – Parks and Forests listings.

The US Government listings? Open Adobe Reader (the new free version 7.0). Select open file, and go to your folder for *Police Call*. Select PDF File, and then USGCD.pdf. You can then scroll, or use Edit-Find for the various federal agencies and individual US Forests. You can print the entire 37 page document if you wish.

Do your research: This is the fun part! Some great wildfire websites include the following:

<http://www.wildlandfire.com/>  
<http://www.nifc.gov/>  
<http://www.fs.fed.us/fire/people/hotshots/>  
<http://www.californiahotshotcrews.org/>  
<http://www.fs.fed.us/fire/>  
<http://www.scancolorado.com/WILDFIRE.htm>

Caveat: As usual, some URLs might change and new sites appear. There are several Yahoo groups that might be worth your time. Do a search. I have several more ideas for preparing for the fire season.

33

*Wildland Firefighter* magazine is the best of the lot (\$29 for 12 issues) at 1-888-456-5367. Their website is <http://www.jems.com>. Note they also offer other magazines, and related programs.

34

Should the Red Cross, or ARES/RACES ask me to respond to the CP for liaison duties, I always carry my full complement of emergency radio equipment. Details about my list will be the main feature of next month's column. If you are a potential communications responder, you *might* need a yellow nomex shirt/jacket. Order one now, because they are hard to find once the season gets rolling. There are several vendors on the web.

35

Need to learn about Incident Command System (ICS)? FEMA offers many courses at <http://training.fema.gov/EMIWeb/IS/crslist.asp>. The specific class to look for is IS-195 ICS. These materials are downloadable from their website. The course is high quality, I highly recommend it.

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I continue with my renewed general interest in railroads and monitoring their frequencies. On a recent trip to Pend Oreille County Washington, I captured a good photo of POVR 1745 engine, an EMD GP10. Note the new bright red paint job for the "Hotstart" of the Pend Oreille Valley railroad (POVR). A small fleet of GP10s is the stable of their working engines. I caught radio traffic on 160.305 and 161.010 MHz. Mmmm, does not does match up to their listed frequencies.



I also heard from reader Don Breitbath about <http://www.altamontpress.com>, and <http://www.djcooley.com>. These sites cater to the interests of West Coast/Northwest railfans, and have regional timetables, books, even free downloads. I am overwhelmed at the amount of web information and the level of intensity in the railfan hobby. I could easily fill every column with a long list of websites on any particular topic that reveal new frequencies, photos, and background trivia on the many facets of railroading. Thanks, Don.

37

Do it yourself repairs? Sometimes you can easily solve small problems, and save yourself some money. But, this only makes sense if you can fully diagnose the problems and have the tools and expertise to make the repair. In many cases, the mere act of "opening up the radio" causes damage that is irreparable. Technical repairs are not for the inexperienced nor the faint of heart. Two efforts by local hams proved disastrous. Superglue is not conductive and *does not* work on repair circuits or to replace soldered batteries. Many older ham transceivers have an internal, watch style battery to maintain memory information. These are a real pain to replace.

One colleague tried to mend a broken solder joint, but overheated and destroyed adjoining components. I could not undo the harm done by these well intentioned efforts of my ham friends. If you have any doubts, the brighter idea and safer decision is to let an expert do these repairs. If the dollar cost will exceed the value returned, you are probably wiser to spend the money on a new radio.

I hate to keep preaching, but I would remind all in the hobby that BNC connectors and power jacks are very "fragile." Constant, or rough handling will eventually break their internal solder connections. It may sound funny, but I feel the hurt every time I see someone's cherished radio bite the dust. Personally, I keep all these old radios on a display shelf as a reminder of the many hours of listening pleasure they provided me or others. Also, you can salvage the power supplies, batteries and antennas. Even in death, things have a value. If this is the only lesson you learn from my column, you have saved yourself the price of the magazine many times over.

The June 2005 column will focus on what you need to have to be prepared for an emergency at home, or as a communications first responder. Let's get ready!

## Scanning Florida and Tennessee

**T**his month we answer reader mail about public safety radio systems in Florida and Tennessee, provide some details about some personal communications services, and wrap up with a reminder about the world's largest radio hobbyist convention.

### ❖ Broward County, Florida

Dan,  
I live in Broward County, Florida. What frequencies do you have on file for the Sheriff's Office and talk group IDs? I am having a great deal of trouble. I have a Bearcat BCT-8 scanner. I am also looking for information on District 11, which is Pompano Beach. Can you help me?

Thanks, Frank

Broward County is located in the south-east part of Florida, just north of Miami on the Atlantic Ocean coast. It covers nearly 1,200 square miles and 23 miles of beachfront. It's the second-most populous county in Florida with about 1.5 million residents.

The County operates a Motorola Type II trunked radio system that carries both analog and APCO Project 25 digital voice traffic.

The system has six sites: three inside the city limits of Fort Lauderdale, and one each in the towns of Coconut Creek, Davie and Pembroke Park.

Frequencies on the system are 852.7125, 852.7375, 852.8125, 855.2375, 856.4875, 856.7375, 857.3625, 857.4875, 857.7375, 857.9875, 858.3625, 858.4875, 858.7375, 858.9875, 859.3625, 859.4375, 859.4875, 859.7125, 859.7375, 859.9875, 860.2375, 860.4875, 860.7375 and 860.9875 MHz.

Decimal	Hex	Description
16	001	Airport Emergency
4112	101	Sheriff Dispatch (South)
4144	103	Sheriff Dispatch 2
4176	105	Sheriff Dispatch (Dania)
4208	107	Dispatch (Pembroke Pines Police)
4240	109	Sheriff Dispatch (Cooper City, Weston, Davie Police)

4272	10B	Court Services
4304	10D	Dispatch (Lauderhill Police)
4336	10F	County Detention
4368	111	Sheriff Dispatch (Tamarac)
4400	113	Sheriff Dispatch (Deerfield Beach)
4432	115	Sheriff Dispatch (West Area)
4464	117	Sheriff Dispatch 10
4496	119	Technical Support
4528	11B	Narcotics
4560	11D	Internal Affairs
4592	11F	Communications Services
17616	44D	Broward Mutual Aid
17648	44F	Fire Mutual Aid
17680	451	Police Mutual Aid

### Broward Fire/Rescue

Since October 2003, the Department of Fire Rescue and Emergency Services has been part of the Broward Sheriff's Office. Fifteen locations and 600 personnel around the county provide fire, medical and rescue services for most unincorporated areas as well as Cooper City, Lauderdale-By-The-Sea, Lauderdale Lakes and Sea Ranch Lakes, Pembroke Park, Southwest Ranches and Weston. The department also operates an Air Rescue helicopter unit at the Fort Lauderdale Executive Airport.



Decimal	Hex	Description
8208	201	Dispatch (North)
8240	203	Dispatch (Central)
8272	205	Dispatch (South)
8304	207	Administrative/Supervision
8336	209	Headquarters
8368	20B	Car-to-Car (North)
8400	20D	Car-to-Car (Central)
8432	20F	Car-to-Car (South)
8464	211	Car-to-Car
8496	213	Tactical (Alpha)
8528	215	Tactical (Bravo)
8560	217	Tactical (Charlie)
8592	219	Special Details
8624	21B	Mutual Aid 1 (North)
8656	21D	Administrative
8688	21F	Administrative
8720	221	Medical Reserve
8752	223	Medcom 1
8784	225	Medcom 2
8816	227	Medcom 3
8848	229	Medcom 4

8880	22B	Medcom 5
8912	22D	Medcom 6
8944	22F	Medcom 7
8976	231	Medcom 8
9008	233	Medcom 9
9040	235	Medcom 10 (Dispatch)
9200	23F	Car-to-Car (West)
9232	241	Dispatch (West)
9264	243	Mutual Aid (West)

### Broward County Schools

The Broward County School system is the sixth largest in the country with more than 274,000 students in 250 schools. They have a number of talkgroups on the county system, but here are a few of the most common:

Decimal	Hex	Description
14544	38D	School Buses (North)
14608	391	School Buses (Central)
14672	395	School Buses (South)
14736	399	School Buses (West)

### Broward Live Feed via the Internet

There is at least one live feed of the Broward Sheriff and Fire/Rescue on the Internet at <http://www.coralsprings.com/scanner/welcome.htm>

If you can get past the series of advertisements on that page, you can hear county activity as well as the city of Coral Springs Police and Fire/Rescue. The site uses a pair of Uniden Bearcat BC895XLT scanners feeding a 1 GHz Pentium computer that delivers a stereo signal - Coral Springs on the left channel and Broward County on the right.

### ❖ Fort Lauderdale, Florida

Within Broward County, the City of Fort Lauderdale operates their own Motorola Type II trunked radio system with analog voice traffic. The system transmits from three sites, two in Fort Lauderdale and one in Pompano Beach. All transmissions are broadcast from each site simultaneously (a process referred to as *simulcasting*).

The 26 frequencies in the system are 866.2125, 866.2375, 866.2625, 866.4125, 866.6625, 866.9125, 867.1875, 867.2125, 867.2625, 867.6125, 867.6375, 867.8375, 867.8625, 867.8875, 868.0375, 868.0875, 868.2875, 868.3125, 868.3375, 868.5375, 868.5625, 868.5875, 868.7875, 868.8125, 868.8375 and 868.9125 MHz.

Decimal	Hex	Description
17648	44F	Fire (Dispatch)

17680	451	Police (Dispatch)
17712	453	Car-to-Car 1
17744	455	Car-to-Car 2
17776	457	Operations 1
17808	459	Operations 2
17840	45B	Operations 3
18000	465	Operations 4
18032	467	Operations 5
18064	469	Operations 6

Talkgroups for Pompano Beach include:

Decimal	Hex	Description
61456	F01	Pompano Fire Battalion 1
61488	F03	Pompano Fire Battalion 2
61520	F05	Pompano Fire Division
61552	F07	Pompano Fire Officers
61712	F11	Pompano Fireground
61744	F13	Pompano Fire Tactical 2
61776	F15	Pompano Fire Tactical 3
61808	F17	Pompano Fire Prevention
61840	F19	Pompano Fire Tactical 5
61872	F1B	Pompano Fire Car-to-Car
61904	F1D	Pompano Fire Tactical 7
61936	F1F	Pompano Fire Tactical 8
61968	F21	Pompano Fire Dispatch
62224	F31	Pompano Police Information
62256	F33	Pompano Police Alternate
62288	F35	Police Command
62320	F37	Police Supervisors (Beach)
62480	F41	Pompano Detectives (Main)
62512	F43	Pompano Detectives (Tactical)
62544	F45	Pompano Criminal Investigation
62576	F47	Pompano Vice (Main)
62608	F49	Pompano Vice (Tactical)
63024	F63	Investigators
63248	F71	Police Car-to-Car (Common)
63280	F73	Police Car-to-Car (East)
63312	F75	Police Car-to-Car (West)
63344	F77	Dispatch (CDC)
63376	F79	Dispatch (East)
63408	F7B	Dispatch (West)
63440	F7D	Tactical (Common)
63472	F7F	Tactical (East)
63504	F81	Tactical (West)
63760	F91	Public Safety
65296	FF1	Beach Patrol (Unit-to-Unit)
65328	FF3	Beach Patrol (Common)
65360	FF5	Beach Patrol (Supervisor)

## ❖ Brevity Codes

Like most forms of communication, radio users have developed ways to communicate information more quickly. One way to do that over the radio is through the use of brevity codes, which are a kind of shorthand for common messages. Nearly everyone has heard the code "10-4", meaning that a message has been acknowledged. Many police and fire departments use a number of these "ten codes," some of which have been in use for more than 60 years. Below is a list of some the most common ten codes in use. Note that many departments have customized the list for their own use, so some codes may mean different things depending on the agency that is using them.

Code	Description
10-1	Receiving Poorly
10-2	Receiving Well
10-4	Acknowledged
10-6	Busy
10-7	Out Of Service
10-8	In Service

10-9	Repeat Previous Transmission
10-10	Out of Service
10-19	Return to Station
10-20	Your Location
10-22	Disregard
10-23	Standby
10-24	Assignment Complete
10-26	Message Received
10-27	Complete Records Check
10-28	Vehicle Registration Check
10-29	Stolen and/or Wanted
10-31	In Pursuit
10-42	Out of Service at Home
10-46	Urgent
10-50	Stopping Vehicle
10-51	Send a Tow Truck
10-52	Send an Ambulance
10-54	Negative
10-52	Estimated Time of Arrival
10-55	Car to Car
10-56	Meet At
10-60	Assist Motorist
10-66	Cancel
10-76	Enroute
10-78	Need Assistance

Many departments also use "Code" numbers to indicate the urgency of the message. Broward County uses the following three priority levels:

Code 1	Routine
Code 2	Expedite
Code 3	Emergency

## ❖ Bearcat BCT-8

The Uniden Bearcat BCT-8 is a base/mobile scanner with 250 memory locations that covers most of the public safety bands, including all of the 800 MHz frequencies we've discussed for Broward County. It is capable of trunk tracking the "big three" in public safety: Motorola, EDACS and LTR systems. Its only drawback is that it does not decode digital voice transmissions, so the APCO Project 25 digital voice traffic on the Broward County system will be out of reach.

## ❖ Memphis, Tennessee

Dan,

*I live in Memphis and Radio Shack told me that the new digital scanner they carry would pick up Memphis, so I bought it. I haven't had any luck hearing them, though. Do you know if it will pick them up? I love listening to the action.*

The Radio Shack clerk was correct, just a little premature. The City of Memphis has operated a Motorola trunked radio system for many years with a type of digital voice transmission called VSELP (Vector Sum Excited Linear Prediction).

VSELP is different than the IMBE (Improved Multi-Band Excitation) standard specified in the APCO Project 25 (P-25) standards and is not compatible with any consumer scanner, including the newest models from Uniden and Radio Shack.

However, the public safety radio system in Memphis is being upgraded to APCO Project 25 standards. The upgrade is scheduled to be complete by May 2005, so by the time you read this the upgrade should nearly complete. If all goes according to plan, the new Radio Shack PRO-96 scanner will be able to follow the action by the end of the month.

There are five repeater sites licensed for the Memphis system. The first is downtown on Jefferson Avenue, across from the Veterans Administration Medical Center. The second is north of the city, across Route 51 from Firestone Park. Two repeaters are south of the city, one along Highway 61 near the Mississippi border and the other more easterly, off Winchester Road close to Riverdale Road. The fifth site is east of downtown, near Interstate 40.

Each of these sites is licensed for the following rather large list of frequencies: 855.4625, 856.2375, 856.4375, 856.4625, 856.7125, 856.9375, 856.9625, 857.2375, 857.4375, 857.4625, 857.7125, 857.9375, 857.9625, 858.2375, 858.4375, 858.4625, 858.7125, 858.9375, 858.9625, 859.2375, 859.4375, 859.4625, 859.7125, 859.9375, 859.9625, 860.2375, 860.4375, 860.4625, 860.7125, 860.9375 and 860.9625 MHz.

Decimal	Hex	Description
48	003	Police Dispatch (North)
80	005	Police Car-to-Car (North)
112	007	Police Computer Database Checks
144	009	Police All City
176	00B	SWAT Tactical
208	00D	Police Dispatch (South)
240	00F	Police Car-to-Car (South)



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272	011	Police Dispatch (East)
304	013	Police Car-to-Car (East)
336	015	Police Dispatch (West)
368	017	Police Car-to-Car (West)
400	019	Police Dispatch (Central)
432	01B	Police Car-to-Car (Central)
464	01D	Police Dispatch (Downtown)
496	01F	Police Car-to-Car (Downtown)
528	021	Police Dispatch (Southeast)
560	023	Police Car-to-Car (Vice)
592	025	Internal Affairs
624	027	Internal Affairs Car-to-Car
656	029	Police Special Operations
688	02B	Organized Crime Unit Car-to-Car
1008	03F	Fire Dispatch (Main)
1040	041	Fire Dispatch (Alternate)
1072	043	Medical Dispatch (Main)
1104	045	Medical Dispatch (Alternate)
1136	047	Fire Operations 1
1168	049	Fire Operations 2
1200	04B	Fire Operations 3
1232	04D	Fire Operations 4
1264	04F	Fireground 1
1296	051	Fireground 2
1328	053	Fireground 3
1360	055	Fireground 4
1392	057	Fireground 5
1424	059	Fire Car-to-Car
1456	05B	Fireground 6
1488	05D	Fireground 7
1520	05F	Fireground 8
1552	061	Fireground 9
1584	063	Fireground 10
2256	08D	Fireground (Mutual Aid)
2768	0AD	Arson Investigators
2800	0AF	Fire Inspectors
3984	0F9	Emergency Operations 1
4016	0FB	Emergency Operations 2
4048	0FD	Emergency Operations 3
4080	0FF	Emergency Operations 4
4112	101	Emergency Operations 5
4752	129	Police Tactical Ch 1
4784	12B	Police Tactical Ch 2
4816	12D	Police Tactical Ch 3
4848	12F	Police Tactical Ch 4
5040	13B	Direct Channel 1
5072	13D	Direct Channel 2
5104	13F	Direct Channel 3
39952	9C1	Motorcycle Patrol 1
41008	A03	Airport Security 1
41040	A05	Airport Security 2
44944	AF9	Motorcycle Patrol 2

462.5875  
462.6125  
462.6375  
462.6625  
462.6875  
462.7125  
467.5625  
467.5875  
467.6125  
467.6375  
467.6625  
467.6875  
467.7125

Channel 2  
Channel 3  
Channel 4  
Channel 5  
Channel 6  
Channel 7  
Channel 8  
Channel 9  
Channel 10  
Channel 11  
Channel 12  
Channel 13  
Channel 14

Use of FRS radios does not require a license and has become a popular replacement for CB radios, since they use Frequency Modulation (FM) rather than Amplitude Modulation (AM) and provide the clarity and quiet you'd expect from FM. In many cases they have also replaced the use of cellular telephones, since FRS radios do not require a monthly subscription or incur a per-minute charge. The Motorola Talkabout pictured here is an example of the handheld radios available today that can provide clear, reliable communication over short distances up to a mile.



Although the unlicensed FRS radios are limited to half a watt of output power, a GMRS radio can operate at up to 5 watts and provide a range of anywhere from five to 25 miles. GMRS requires a license, but an individual can obtain one "to facilitate the activities of immediate family members."

GMRS has 16 UHF frequencies and operates in one of two modes. The first mode is simplex, like FRS. The second mode is through a repeater, where the repeater receives transmissions on one frequency (*input*) and retransmits them on a second frequency (*output*).

Eight of the frequencies are designated for simplex operation. Those same eight may also be used as repeater output frequencies. The other eight are only for repeater input. Usually input and output frequencies are paired, separated by 5 MHz, but any pairing is allowed.

GMRS Frequency	Description
462.550	Output/Simplex 1
462.575	Output/Simplex 2
462.600	Output/Simplex 3
462.625	Output/Simplex 4
462.650	Output/Simplex 5
462.675	Output/Simplex 6
462.700	Output/Simplex 7
462.725	Output/Simplex 8
467.550	Input 1
467.575	Input 2
467.600	Input 3
467.625	Input 4
467.650	Input 5
467.675	Input 6
467.700	Input 7
467.725	Input 8

## ❖ Personal Two-Way Communications

We've come a long way since the Citizen's Band (CB) craze of the 1970s. Although CB radios continue to be used, much of the personal radio communication activity has moved on to the General Mobile Radio Service (GMRS) and Family Radio Service (FRS).

The Federal Communications Commission (FCC) defines FRS in Part 95 Subpart B of their rules. There are 14 UHF frequencies assigned to FRS, all defined for *simplex* operation. Also called *talk-around*, simplex means all voice activity occurs on the same frequency, so a scanner set to monitor that frequency will hear all parts of the conversation.

FRS Frequency	Description
462.5625	Channel 1

## ❖ Dayton Hamvention

The 54th annual Dayton Hamvention will take place on May 20, 21 and 22 in the city of Dayton in southwest Ohio. It is the largest amateur radio convention in the world. Major equipment manufacturers like Icom, AOR and Optoelectronics often introduce new products at the Hamvention from the 500-space indoor exhibit area. The outdoor flea market has more than 2,500 spaces, and as long as the weather is reasonable you can find bargains galore.



In addition to the gadgets, the Hamvention runs a number of forums, covering everything from antenna technology and design, low power operation, kit building, using satellites, disaster relief operations to "fox hunting" (finding hidden transmitters).

The Hamvention is held at the Hara Arena located at 1001 Shiloh Springs Road in the town of Trotwood, Ohio. You can read more about the convention and view photographs from previous years at <http://www.hamvention.org>. If at all possible, take the time to come and spend a weekend with fellow radio enthusiasts.

Dayton operates their own analog Motorola trunked radio system on the following frequencies: 856.2125, 856.4625, 856.7125, 856.9625, 857.2125, 857.4625, 857.7125, 857.9625, 858.2125, 858.4625, 858.7125, 858.9625, 859.2125, 859.4625, 859.7125, 859.9625, 860.2125, 860.4625, 860.7125 and 860.9625 MHz.

Decimal	Hex	Description
36848	8FF	Dispatch
36880	901	Fireground 2
37424	923	Fire Car-to-Car
37456	925	Fire Support Services
37488	927	Fire Prevention
37520	929	Emergency Medical Services
37872	93F	Police Dispatch
45424	B17	Parking Patrol (Dispatch)
45456	B19	Parking Patrol (Towing)
45488	B1B	Parking Patrol (Citations)
46448	B57	Police Dispatch (West)
46480	B59	Police Records
46512	B5B	Police Dispatch (East)
46544	B5D	Police Car-to-Car 1
46576	B5F	Police Car-to-Car 2
46768	B6B	Special Events
46800	B6D	Traffic
46832	B6F	SWAT

Before heading for the Hamvention, plug in these frequencies and talkgroups into your scanner and stay informed throughout the convention weekend.

That's all for this month. More frequencies and scanner information is available on my web site at <http://www.signalharbor.com>. If I don't see you at the Dayton Hamvention you can always send me electronic mail at [danveeneman@monitoringtimes.com](mailto:danveeneman@monitoringtimes.com). Until next month, happy scanning!



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R20	SCN 20	\$519.95

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### AOR

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## Hear the Space Shuttle Return to Flight

**A**s we go to press, the launch window for the first space shuttle flight since the loss of *Columbia* is right when this column comes out. It seems like a good time to review where this exciting program turns up on shortwave radio.

As we've certainly seen, there are no routine manned space missions. Listening in is more than a casual diversion for many concerned individuals. A result of all this interest is the great volume of information that is found on the Internet. As usual, though, much of the online information is dated, or just plain wrong.

The shuttle never actually transmits on high frequency (HF). Most communication comes from air and ground operations supporting the launches at the Kennedy Space Center's historic pads 39A and B. This complex is located at the north end of the famous Cape Canaveral launch area in east central Florida.

While KSC is an activity of the National Aeronautics and Space Administration (NASA), it uses the US Air Force Space Command's Eastern Test Range (ETR). This 5000-mile range begins at a number of sites on and around the Cape. It has additional tracking assets at Antigua in the Caribbean, and on Ascension Island, far out in the Atlantic Ocean.

Obviously, such a far-flung operation has hundreds of possible HF frequencies. We'll try to hit a few that you're most likely to hear something on.

### Cape Radio

The ETR's big gun on HF is "Cape Radio," which sometimes uses the static callsign of FISH-ER. This flame-thrower is across the Banana River from KSC, at the Cape Canaveral Air Force Station. Like most technical activities at the range, it's contracted out to Computer Sciences Rockwell.

Cape Radio's primary frequency is 10780 kilohertz (kHz) upper sideband (USB). Secondary is 20390 USB. These two frequencies also serve as a backup to the Air Force's separate High-Frequency Global Communications System (HF-GCS).

Cape Radio is also a heavy user of the primary range frequency of 5180 kHz USB. 10780 and 5180 are definitely the places to listen, starting 24-36 hours before a launch, as ships and aircraft begin to deploy.

### Launch Day Activities

As launch approaches, you'll hear two major nets. First is booster recovery. As we know, the spent Solid Rocket Boosters fall away a few

minutes into flight. They parachute into the ocean downrange, to be brought home by two NASA Booster Recovery Vessels (BRV), the *Freedom Star* and *Liberty Star*.

This net is something of a catch. It can start out on 5180, but it usually goes to a number of low frequencies with limited coverage, especially in daytime.

The other, larger net is for range safety. Barring some kind of worst-case scenario involving the "destruct" command, range safety ships and/or aircraft are basically the traffic cops. Their mission is to keep everyone else away while a hazard exists. The whole, vast range has to be "go" before the shuttle can launch. You might also hear the occasional radio check with Antigua and Ascension.

Another callsign that's sometimes heard on the range safety net is the military activity identifying as "DoD Cape." This stands for the US Department of Defense. There might also be an occasional Air Force rescue planes identifying as "KING" plus a number.

If you're lucky, you might even run across some instrumentation traffic. The range uses a lot of telemetry, lightning sensors, chase aircraft, and every other imaginable data-gathering activity. Time was when the bottle-nosed ARIA (Advanced Range Instrumentation Aircraft) would come east from their California home base to receive spacecraft telemetry downrange. However, this interesting but costly mission was terminated in 2001.

### Real-Time Audio

Since the first flight, many amateur radio stations have retransmitted the NASA mission communications between space shuttle astronauts and the ground. The FCC has made an ongoing exception to its amateur broadcasting prohibition for shuttle audio, wake-up music and all.

Most people listen to local amateur repeaters on higher frequencies, but HF feeds do exist. The biggest one is from WA3NAN at NASA's Goddard Space Flight Center in Maryland. It simulcasts on several bands, using lower sideband on 75 and 40 meters, others USB. Frequencies can vary slightly, to avoid interference.

In the past, shuttle audio has sometimes been heard from Houston's Johnson Space Center, and even the Jet Propulsion Laboratory (JPL) near Los Angeles, CA. It has also been known to turn up outside amateur bands, presumably from government or MARS (Military Affiliate Radio System) stations.

### Space Shuttle Frequencies

(All in kHz and USB unless noted)

2356.0	BRV ship/ship
2622.0	All nets
2622.0	BRV ship/ship
2638.0	ETR Clearance
2639.0	BRV ship/ship
2716.0	Harbor
2764.0	Range Safety/Booster Recovery
2800.0	BRV ship/shore
2820.0	BRV ship/shore
2836.0	Range Safety
2837.0	BRV ship/shore
3041.0	All nets
3089.5	HF air/ground
3120.0	Range Safety
3187.0	Range Safety/Booster Recovery
3365.0	Range Safety/Booster Recovery
3385.0	ETR Emergency Net
3395.0	ETR Emergency Net
3840.0	Houston/JPL Mission Audio (LSB)
3860.0	Goddard Mission Audio (LSB)
4520.0	Range Safety
4604.5	ETR Emergency Net
4704.0	Range Safety
4856.5	Range Safety
4992.0	Range Safety
5011.0	Range Safety
5180.0	Cape Radio/Range Ops Primary
5187.0	"DoD Cape" Range Safety
5190.0	Range Safety/Booster Recovery
5211.0	Booster Recovery
5246.0	Range Safety/Booster Recovery
5711.0	Range Safety/Booster Recovery
5717.0	Range Safety/Booster Recovery
5810.0	All nets
6724.0	"DoD Cape" Range Safety
6751.0	Cape Radio working ships
6897.0	Range Safety
6937.0	Cape Radio/ETR Control
6982.5	ETR Emergency Net
7185.0	Goddard Mission Audio (LSB)
7461.0	Range Safety
7672.0	Cape Radio/ ETR Control
7676.0	Booster Recovery
7765.0	All nets
9023.0	Range Safety
9043.0	Range Safety
10780.0	Cape Radio Primary
11104.0	Cape Radio & DoD Cape
11217.0	Range Safety
11407.0	All nets
11440.0	Antigua Search & Rescue
11615.5	Cape Radio/ ETR Control
13237.0	Cape Radio
13878.0	Cape Radio
14280.0	Houston Mission Audio
14295.0	Goddard Mission Audio
14967.0	Cape Radio
15062.5	HF air/ground
20195.0	Cape Radio
20390.0	Cape Radio Secondary
21280.0	JPL Mission Audio
21350.0	Houston Mission Audio
21395.0	Goddard Mission Audio
28495.0	Houston Mission Audio
28650.0	Goddard Mission Audio

## ABBREVIATIONS USED IN THIS COLUMN

ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CW	Morse code telegraphy ("Continuous Wave")
DEA	US Drug Enforcement Administration
DSC	Digital Selective Calling
E10a	Abnormal Israeli female phonetic "numbers"
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
HFDL	High-Frequency Data Link
HF-GCS	High-Frequency Global Communications System
JSTARS	Joint Surveillance Target Attack Radar System
LSB	Lower Sideband
M21	Russian CW air tracking, ?=missing character
M22	Israeli CW "numbers," weather, and messages
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
Navtex	Navigational Telex
Piccolo	High-pitched British multi-tone teleprinting
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission
SHARES	Shared Resources
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
VFT	Voice Frequency Telegraphy

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

518.0	"P"-Haifa Radio, Israel, gale warning for Middle East at 2020. "L"-Rogaland Radio, Norway, SITOR-B Navtex distress relay for a fire aboard vessel <i>Fjord Champion</i> , at 2050. "R"-Monsanto Radio, Lisbon, Portugal, SITOR-B Navtex warning of man overboard near Madeira Islands, at 2130. (Patrice Privat-France)
1641.0	OXJ-Thorshavn Radio, Faroe Islands, listening on 20663, at 0635. (Privat-France)
1680.0	LGL-Floroe Radio, Norway, marine bulletins at 0645. (Privat-France)
1743.0	Unid-Probably Stornoway Coast Guard Radio, UK, weather at 0112. (Privat-France)
2187.5	GDNP-Ship <i>Grampian Pioneer</i> , calling MWQB7, vessel <i>Grampian Frontier</i> , in DSC at 2021. (Day Watson-UK)
2219.5	Unid-Russian Air Defense, probably Moscow area (M21), CW time-stamped data markers every minute, at 2023. (Watson-UK)
3700.0	"Yosemite Sam" - Weird pirate beacon, Laguna Pueblo Reservation, NM, repeating databurst with "varmint" cartoon voice loop, in rotation with 4500, 6500, and 10500 kHz, apparently 24/7. (Tom Severt-KS) ["Sam" has been definitively traced to a US Army contract facility! TOO strange! -Hugh]
4041.0	NNNOZWR-US Navy/Marine Corps MARS, closing a net at 0059. (Mark Cleary-SC)
4232.0	RFLIE-French Navy, RTTY testing at 0243. (Severt-KS)
4271.0	CFH-Canadian Forces, Halifax, NS, RTTY weather at 0436. (Bob Hall-RSA)
4369.0	WLO-Mobile Radio, AL, voice-synthesized 'female' weather voice at 0258. (Severt-KS)
4372.0	Franchise-US Navy, working "Z-6-D" at 2040. (Cleary-SC)
4583.0	DDK2-Hamburg Meteo, Germany, RTTY marker and information for North and Baltic Seas, also on 7646 and 10100.8, at 1446. (Watson-UK)
4721.0	IKF-US Air Force, Keflavik, Iceland, working CRO, Croughton, UK, at 0104. (Watson-UK)
4724.0	Jayhawk-US Air Force, surveillance exercise with Royal and Night-

4739.0	star (E-8C JSTARS), at 1622. (Cleary-SC)
	Rescue 320-Unknown unit patching Rescue Coordination Centre via Halifax Military on a search, at 0239. (Cleary-SC)
4751.0	TWLX-Spanish Guardia Civil, Vizcaya, calling TXXX, Valdemoro, ALE at 0200. (Watson-UK)
4951.5	Unid-Russian Air Defense, probably Moscow area (M21), CW time-stamped data markers every minute, at 2112. (Watson-UK)
5320.0	Cutter <i>Cochito</i> -US Coast Guard, reporting whales to Group Cape Hatteras, at 1359. (Cleary-SC)
5422.5	North Raleigh Radio-US Coast Guard Auxiliary, net with Choptank Radio and Mooresville Radio, at 0003. (Cleary-SC)
5547.0	Evergreen 6307-Evergreen International Airlines, position for San Francisco at 0404. (Severt-KS)
5616.0	NWA52-Northwest Airlines #N806NW, working Gander Radio, Canada, at 0104. Gander, company patch from Atlas dispatch to GTI 8629, at 0135. Reach 833Y-US Air Force charter transport, position and fuel for relay to North American Airlines via Gander, at 0147. Air Force One-US Air Force Presidential aircraft, working Shanwick Radio, Ireland, at 2025. (Cliff-UK)
5684.0	Hunter 16-Canadian Forces, working Halifax Military, at 2143. (Cleary-SC)
5696.0	Coast Guard 2128-US Coast Guard helicopter enroute from Guantanamo to Haiti, working CAMSLANT at 1253. (Cleary-SC)
5720.0	N312UP-United Parcel Service flight 6703, HFDL position at 0837. (Watson-UK)
5732.0	Ping Pong-US Customs, TX, working Omaha 4CS at 0100. 17C-DEA, investigating a vessel with Panther at 2326. (Cleary-SC)
5792.0	RABAT-French Embassy, Morocco, calling CER11, French MFA, Paris, at 1707 and 1840. (Watson-UK)
5875.0	EAATS-Eastern Army Aviation Training Site, PA, ALE sound at 1250. (Ron Perron-MD)
6379.0	4XZ-Israeli Navy, Haifa (M22), CW markers and traffic at 2015. (Watson-UK)
6501.0	NMN-US Coast Guard CAMSLANT Chesapeake, VA, with weather being read by a live male (not "Perfect Paul"), with interference from "Yosemite Sam" on 6500, at 1735. (Severt-KS)
6507.1	SVO-Olympia Radio, Greece, voice loop announcing calling channels on numbers 806, 1232, 1640, and 2217, in English and Greek from 0030 to 0330. (Alvin Mirabal, PR)
6535.0	LH0502-Lufthansa flight working "Atlantico" (Recife, Brazil), in Portuguese at 0600. (Privat-France)
6694.0	Pathfinder 20-Canadian Forces, working Halifax Military at 2342. (Cleary-SC)
6721.0	500322-US Air Force Reserve tanker, working ADW (Andrews Air Force Base, MD) in ALE, then no joy in voice as Mash 84, at 2316. (Perron-MD)
6761.0	Ethyl 58-US Air Force tanker, working transport UHAUL 99, at 2347. (Cleary-SC)
6911.5	KYAASF-KY National Guard Aviation Support Facility, ALE sound at 1240. (Perron-MD)
6930.0	SYN2Z58-Abnormal Israeli Intelligence callup (E10a), at 0453. (Severt-KS) SYN2 callup only (E10a) at 2230. (Mark Morgan-OH)
7310.0	705-Probably Canadian Forces, calling 705A, in ALE at 1254. (Perron-MD)
7313.5	AFF2FL-US Air Force MARS, working AFF2TFL in Florida Training Net, at 1401. (Cleary-SC)
7617.0	RM4-Mexican Army 4th Region, Monterrey, calling CAMALEON3 in ALE, at 0157. (Perron-MD)
7632.0	NNNOKAG-Control in SHARES Southeast Region Net, checking in stations at 1615. (Cleary-SC)
7635.0	Hill CAP 49-Civil Air Patrol, national net with Headcap 45 and Kitty Hawk 30, at 1725. (Cleary-SC)
7771.5	L2C-Argentine Navy, Buenos Aires, SITOR-B weather in Spanish, at 0450. (Hall-RSA)
8103.0	4XZ-Israeli Navy, Haifa (M22), CW traffic possibly in Hebrew at 2045 and 2101. (Watson-UK)
8146.5	IMB55-Rome Meteo, FAX weather chart and volcanic ash warning, at 2254. (Watson-UK)
8151.5	9MR-Malaysian Navy, RTTY administrative traffic at 2139. (Hall-RSA)
8171.5	R23566-US Army National Guard, VT, calling 86OPS (86th Medical), also 6911.5 and 9295, ALE at 2023. (Perron-MD)
8192.3	9MR-Malaysian Navy, RTTY administrative traffic in Malay, at 1606. (Hall-RSA)

- 8280.0 PNRN5-Venezuelan Navy Post, Rio Negro, calling BRIFR15 in LSB ALE, at 0358. (Perron-MD)
- 8293.0 VTP13/14-Indian Navy, RTTY test loop at 1547. (Hall-RSA)
- 8297.7 VTP13/14-Indian Navy, RTTY weather "to all concerned" in English, at 2127. (Hall-RSA)
- 8301.6 Sri Lanka Navy P 621-Former US Coast Guard Cutter *Courageous*, working Sector San Juan at 1946. (Cleary-SC)
- 8452.7 RFFMEA-French Navy, RTTY test loop to all ships at 2116. (Hall-RSA)
- 8971.0 Wafer 20-US Navy P-3C with Spare Group report for Goldenhawk, ME, at 2128. (Cleary-SC)
- 8992.0 Reach G3-US Air Force tanker relaying message to Qatar via Andrews HF-GCS, at 2224. (Cleary-SC)
- 9007.0 Canforce 4495-Canadian Forces, working Trenton Military at 0005. (Cleary-SC)
- 9025.0 Coast Guard 1504-US Coast Guard, ALE-initiated patch via US Air Force net to Lantarea Command, at 1906. (Cleary-SC)
- 9106.7 Unid-Egyptian MFA, Cairo, working Bonn embassy in Arabic SITOR-A, at 1728. (Watson-UK)
- 9129.7 Unid-Egyptian Embassy, Vienna, Austria, SITOR-A traffic at 1722. (Watson-UK)
- 9145.0 RIW-Russian Navy, Moscow, calling RKW95, CW at 1630. (Watson-UK)
- 9145.0 832410-US Army, GA, calling CLH, possibly Hunter Air Field, also on 8056.0, ALE at 1556. (Perron-MD)
- 9198.0 4P0-Chilean Navy, calling CA2 in LSB ALE, at 0057. (Perron-MD)
- 9200.0 Leskoviku-Albanian Army, calling Shebeniku, ALE at 1904. (Watson-UK)
- 9316.7 Unid-Egyptian MFA, Cairo, working Asmera, Eritrea, in Arabic SITOR-A, also listening on 9226.7 and 14566.7, at 1655. (Watson-UK)
- 10045.0 4XZ-Israeli Navy, Haifa (M22), CW marker at 1852. (Watson-UK)
- 10066.0 SU0106-Aeroflot flight working Hat Yai ground station, Thailand, in HF DL at 1526. (Watson-UK)
- 10075.0 SU0106-Aeroflot flight working Bahrain ground station in HF DL, at 1616. (Watson-UK)
- 10081.0 ZS-SFI-South African Airways flight 527, HF DL position (west of South Africa), at 0412. SAA400-South African Airways, HF DL position (similar) at 0544. G-VSHY-Virgin Atlantic flight 200, HF DL position (South Pacific) at 1450. (Glenn Blum-TX) [Good DX. -Hugh]
- 10100.8 DDK9-Hamburg Meteo, RTTY weather, parallel on 8581.5 and 16449.2, at 2123. (Hall-RSA)
- 10183.0 "Sierra-3-Delta"-US military, 3 EAMs at 2340. Same station came back as "7-Oscar-Bravo," next UTC day's call, with 3 EAMs at 0016. (Jeff Haverlah-TX)
- 10242.0 25C-DEA aircraft, working Panther at 2047. (Cleary-SC)
- 10626.0 RFFXL-French Forces in United Nations Interim Force In Lebanon, Naqoura, with ARQ traffic to RFFAB, Paris, at 1609. (Watson-UK)
- 10691.5 814388-US Army, KY, calling HTR, probably Hooter Ops, Ft. Campbell, KY, also 8056 and 9145, ALE at 1941. (Perron-MD)
- 10818.0 "I-7-W"-Joint US Coast Guard and Colombian Navy Patrol, sending "J-3-D" to frequency "Blue/Azul-6," at 2318. (Cleary-SC)
- 10993.6 Shark 14-Probable US Coast Guard, working Sector Key West at 2342. (Cleary-SC)
- 11175.0 SAM 8570-US Air Force Distinguished Visitor flight, phone patch via Offutt HF-GCS, stepped on by Offutt with a scheduled EAM, at 1531. Pelican 712-US Navy P-3, patch via Offutt to Fiddle, FL, at 1543. Offutt, working Andersen Training at 1546. (Haverlah-TX) McClellan, CA, EAM with interference from unid male making rude noises, at 1807 (Sevart-KS) Elmendorf-US Air Force HF-GCS, working Reach 1009, who required assistance, at 2256. (Perron-MD)
- 11205.0 Hunter 16-Canadian Forces, working Halifax Military at 2133. (Cleary-SC)
- 11205.0 Smasher-US Joint Task Force, FL, working Shark 84 (a C-130), at 1621. (Cleary-SC)
- 11205.0 Smasher-US Joint Task Force, FL, taking position of aircraft R24181, at 1425. (Perron-MD)
- 11229.0 Appetizer-US military, working Brown Recluse and calling Optional, at 1953. (Cleary-SC)
- 11232.0 Trenton Military-Canadian Forces, taking formatted report from Razor 33 (US Air Force E-8 JSTARS), at 1550. Trenton, working Atlas 41 at 1849, Canforce 2699 at 1905, and Canforce 2705 (a C-130) at 2150. (Perron-MD)
- 11427.5 MAE-Algerian MFA, Algiers, with ALE-initiated skyfax to TRP, Tripoli, Libya, also on 11472, at 1151. (Watson-UK)
- 11475.0 TNS-Algerian Embassy, Tunis, Tunisia, working MAE, Algiers, in ALE at 1044. (Watson-UK)
- 12710.5 PWZ33-Brazil Navy, RTTY warnings in English, at 2131. (Hall-RSA)
- 12745.5 JJC-Tokyo Radio, slow FAX Kyodo newspaper in Japanese, at 1556. (Hall-RSA)
- 13200.0 Titan 20-US Marine KC-130, patching Titan Ops via Andrews HF-GCS, at 1941. (Cleary-SC)
- 13321.0 ZS-SFF-South African Airways flight 144, HF DL position for Johannesburg at 1208. (Hall-RSA)
- 13510.0 CFH-Canadian Forces, Halifax, FAX weather chart at 1625. (Privat-France)
- 13538.8 ZSJ-South African Navy/ Air Force Meteo, Silvermine, FAX weather chart at 1551. (Hall-RSA)
- 13886.5 Unid-Moscow Meteo, FAX weather chart at 1632. (Hall-RSA)
- 13927.0 Pack 11-NH Air National Guard tanker, MARS patch to Pack Control at 2050. (Sevart-KS)
- 13993.0 AFA4C-US Air Force MARS, calling Ramstein at 1833. (Sevart-KS)
- 14467.3 DDH8-Hamburg Meteo, RTTY weather at 1451. (Watson-UK)
- 14629.7 Unid-Egyptian MFA, Cairo, calling Bonn, Germany in SITOR-A, at 0954. (Watson-UK)
- 14757.0 P16CAV-Unknown US Army, ALE sound at 2116. (Perron-MD)
- 14761.5 HONDO1-US Army, calling SKYWAT (Skywatch, Honduras), ALE at 1901. (Perron-MD)
- 15016.0 Offutt-US Air Force HF-GCS, several EAMs at 0002. (Sevart-KS)
- 15025.0 LH8419-Lufthansa flight, with HF DL position at 1614. (Watson-UK)
- 15025.0 Shark 66-US Joint Task Force, relaying to Smasher for Shark 80, at 2255. (Cleary-SC)
- 15920.0 CFH-Canadian Forces, Halifax, all-warships RTTY loop at 2129. (Sevart-KS)
- 15988.0 DDK7-Hamburg Meteo, RTTY weather at 0735. (Hall-RSA)
- 16144.5 WAROPS-US Army, Soto Cano, Honduras, ALE sound at 1723. (Perron-MD)
- 16155.0 GYA-UK Royal Navy, Northwood, FAX weather chart on additional North Atlantic frequency, at 1355. (Watson-UK)
- 16813.0 UAT-Moscow Radio, CW identifier in ARQ marker at 1609. (Hall-RSA)
- 16840.5 4XZ-Israeli Navy, Haifa (M22), CW marker at 1516. (Watson-UK)
- 16879.0 LZW-Varna Radio, Bulgaria, SITOR-B traffic list at 1453. (Watson-UK)
- 16951.5 6WW-French Navy, Dakar, Senegal, RTTY test loop at 1202. (Hall-RSA)
- 17458.5 A090ZN-Army National Guard, AZ, calling A092ZNEMERGEN, an emergency unit, ALE at 1655. (Perron-MD)
- 17982.0 India Victor-Brazilian Air Force flight inspection group, ALE sound at 2154. (Perron-MD)
- 17988.0 PTH-US Coast Guard, Port Huron, MI, ALE sound at 2138. NOJ-US Coast Guard, Kodiak, AK, ALE sound at 2151. (Perron-MD)
- 17994.0 Trenton Military-Canadian Forces, working Canforce 4407 regarding bad weather, at 1844. (Perron-MD)
- 18237.9 ZSJ-South African Navy, Capetown, FAX weather chart at 1547. (Watson-UK)
- 18757.0 RFGW-French MFA, Paris, FEC idler at 1650. (Hall-RSA)
- 19103.5 SKYWAT-US Army, Honduras, calling RUH981, ALE at 2031. (Perron-MD)
- 19615.9 Unid-UK military, Piccolo in multi-channel VFT, encrypted traffic at 1037. (Watson-UK)
- 20056.7 Unid-Possible Egyptian MFA, Arabic SITOR-A traffic at 1015. (Watson-UK)
- 20810.6 KWK95-US State Department embassy net, calling KWK96, ALE at 2113. (Perron-MD)
- 22403.0 UIW-Kaliningrad Radio, CW identifier in ARQ marker, parallel 16833.5, at 1600. (Hall-RSA)
- 22446.7 FUV-French Navy, Djibouti, RTTY test loop at 1145. (Hall-RSA)
- 22744.0 "Radio Olivier"-Unknown station with voice loop in English and Spanish, "...call us on 806 [8210 -Hugh], 12320, 16400, 22744" at 1550. (Hall-RSA)

## The Versatile Frequency Manager

**W**e can all do with a little help from the computer to improve our digital listening experience from time to time. It's been about four years since I last took a look at Ingenieurbüro feur Satellitentechnik's (IfS) PC Frequency Manager suite, but owner Roland Proesch has been hard at work over the years improving the program and expanding its capabilities.

Delivered on CD-ROM, the program will work on any PC running Windows 98, NT, 2000 or XP. The company recommends a Pentium III processor speed of at least 1GHz and 50Mb of free disk space; however, I installed and successfully ran the latest version on a 350MHz Pentium II system. Even though it was understandably a little sluggish, it was still perfectly usable on this somewhat outdated equipment.

### Up and Running

Installation of the program is straightforward and requires an email to be sent to IfS for a registration key. I received my key within a few minutes of sending the email early on a Saturday morning (you can also fax or phone for your key).

Configuration of PCFM is similarly easy and requires a choice of language (English or German), your location (latitude and longitude), the hard drive paths to your digital decoder and DRM (Digital Radio Mondiale) decoder programs if you have them, and your favorite propagation prediction program.

If you've not used a program like PCFM before, there is a very extensive, 300 page manual in PDF included on the CDROM, which provides a very solid background to utility listening and digital systems, in addition to the operation of the program itself.

### Integrated Databases

PCFM7.0 packs a lot of very useful functions into a highly integrated suite:

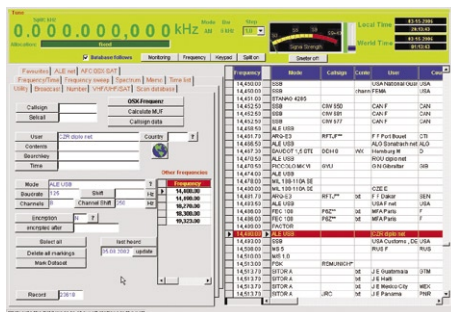
- Databases for callsigns, HF utility and broadcast stations, weather stations, previously active utility stations, VHF/UHF and satellite stations
- Various propagation analysis, prediction and antenna pointing tools
- Descriptions and audio clips of many data signals
- Radio control functions (supporting many popular receivers)
- Digital decoder control functions (most useful with the Hoka Code300-32 system)
- ATU-80 Arabic translations (very useful for listening to the Egyptian diplomatic service)
- ITU and ISO three letter country codes (essential for good logkeeping)
- The DJOSX satellite prediction program

PCFM provides detailed databases covering utility, broadcast and spy "number" stations. These are all accessed by clicking the appropriate database

button on the program's home screen. Figure 1 below shows the screen after selecting the utility database, where frequency, callsign, time, location, and system information (such as whether or not the signal is encrypted) are all included.

There are some nice touches here, too. For example, clicking on any of the database entries shows other frequencies on which the same station or network appears. You can immediately jump to these frequencies by double clicking on them. You can also see that switching between any of the databases is a simple matter of selecting the appropriate "tab".

You can also tune one of several radios directly from a database entry or have the database follow you along as you tune. The program can plot a path from your location to the signal transmitter or check the likely propagation and field strength for the time of day and frequency (more on these features later).



The utility database contains about 3,000 entries. There is also a database of over 10,000 historical utility frequencies, which are sometimes useful in providing clues to an unknown or new signal.

You can also check information on over 12,000 ICAO weather stations, 10,000 irregular callsigns, 125,000 ITU-registered callsigns and other station identification information.

If your favorites are the spy "numbers" stations used by various intelligence agencies to send coded messages to agents in the field, IfS provides a database of many thousands of frequencies identified by the ENIGMA numbers station monitoring group's classifications.

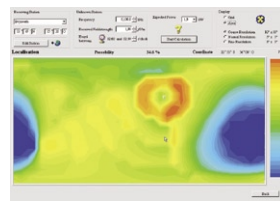
Most importantly, PCFM's databases are not just read-only. You can add your own entries or edit and delete existing information as you wish. Import from simple database formats is also possible, although we didn't try this feature.

PCFM also includes a built-in bandplan, so regardless of where you live, you can see precisely what kind of stations you can expect to hear in a given portion of radio spectrum.

### Propagation Tools

A good knowledge of radio propagation is vital to getting the best out of any kind of HF listening, and utility stations are no different. PCFM helps out on this front, too. If you are lucky enough to have a directional "beam" antenna, or if you are interested in bearing and distance (via the long path or short path) to any station from your location, this is easily calculated and displayed in various user-selectable formats, including a world map.

For newly discovered and unlocated stations, an analysis of prevailing conditions for the frequency and time of day can provide very useful clues as to the possible location of the station.



In Figure 2 you can see the expected field strength contours from Maine to Beirut on 8100kHz at 0200UTC, which tells us that a 1kW transmitter should be audible at that time and frequency.

PCFM also provides a number of different plots of estimated signal strength from any location to yours (or another location). This analysis can also be done for any location in order to estimate the likelihood of hearing the station over a 24 hour period given a user-specified fixed frequency or across a range of frequencies. The results can be plotted in a 3D or 2D graph or as field strength contours on a world map. These are some incredibly powerful and useful tools.

There are a number of preset locations to choose from, although these can be deleted, added to or edited to your own preference. We found the default list of locations to need some work as they appear to be derived from weather station locations and airfields rather than, for example, major cities of the world, which would probably be more useful. However, as a simple and convenient workaround, you can also choose start and/or end locations by pointing to its position on a world map.

### More Next Month

Next month we'll conclude our review with a look at additional databases and radio control using PCFM. If you can't wait until then for the bottom line, PCFM is \$99 plus \$15 for worldwide shipping from IfS, Muehlenweg 11, 24217 Stakendorf, Germany; telephone +49 4344 6758, fax +49 4344 5154; <http://www.frequencymanager.de>

That's it for this month. Happy digital DXing.

## Dr. Eugene Scott, R.I.P.

The seemingly limitless lung capacity of Dr. Gene Scott and his nonstop University Network broadcasts on several SW stations was interrupted UT February 22 at 0132 for an announcement by his wife Melissa that he had died an hour before, first reported to us by Jim Moats, OH. A funeral, or rather "send-off ceremony" was to follow the next Sunday, and then Pete Fountain's version of *Just a Closer Walk with Thee* was repeated over and over for hours, as noted by Fred Waterer, ON. She said that his final day was quite painful; it was known that he had been suffering from cancer, but subsequent obituaries said it was prostate cancer, not lung cancer as expected from all his cigar-puffing on camera. Actual cause of death: a stroke. He was 75.

By the following day it was business as usual. Few of his broadcasts had been live anyway, but drew on an immense tape library of previous sermons, which could continue indefinitely for years, should his heirs choose to spend his fortune that way. His sermons included profanity, denunciations of his incompetent staff, and stare-downs demanding money: "Get on the telephone!"

He lived lavishly and did not hide it, but was also a philanthropist

for causes in the Los Angeles area. Mark Travis, his chief of staff, said the ministry was taking in more than \$1 million a month.

Rev. John Cereghin, DE, told *DX Listening Digest*, "I really can't see Scott's broadcasting empire continuing much longer. Scott dominated his University Network and left no clear successor at his Los Angeles church. The best candidate to take over would be his "disciple", E. C. Fulcher of Abingdon, Maryland, who has built his own media network. Will the King's Houses and Scott's other supporters keep sending in money for whoever will follow Scott? Unlikely, as Scott never really prepared the way for anyone to follow him. He was a charismatic radio personality who is not easily duplicated, most of all in the minds of his followers. This makes for an interesting scenario of what happens to all that transmitter time that would be freed up if the University Network does fold up."

Three weeks later, his tapes were still going strong on WWCR 13845/5935, Caribbean Beacon, Anguilla 11775/6090, KAIJ Dallas 13815/5755, and his own Costa Rican outlets on 5030, 6150, 7375, 9725, 11870, 13750.

**ANTIGUA** A-05 schedule of Deutsche Welle revealed that they would abandon the Antigua transmitters as of March 27 and replace them by Montsinéry [see GUIANA FRENCH] (Kai Ludwig, Germany, *DX LISTENING DIGEST*) DW has been co-owner of the Caribbean Relay Co. there along with BBC from the outset. Presaging this were the DW DRM tests via GUF in Feb (gh)

Not only DW, but BBC is also moving most of their Antigua transmitter-hours to Montsinéry. A few hours move to Bonaire. Appears there will be a net loss of transmitter hours to the region in English (Richard Cuff, PA, *DXLD*) So what is the root problem at Antigua? Is it being phased out? Transmitters conking out? Temporarily down for refurbishing? (gh)

Money-saving activity. For the BBC it appears there's a net gain - yes, they'll pay rental fees to TDF but will save over what it would have cost to run Antigua. I don't know if DW's economics are similar. Bonaire and Antigua are run off diesel generators. Crude oil at \$53+ per barrel probably doesn't help. Long-term plans aren't certain, but the facility could potentially be sold. Where will the savings go? Probably to Middle East radio & TV services. It would seem that TDF, Merlin, and the broadcasters realized there was excess capacity among Montsinéry, Antigua, and Bonaire - and that it made collective economic sense to operate two facilities each at, say, 80% of capacity vs. three facilities each at 55% capacity (Rich Cuff, *ibid.*) Decided at short notice? I saw an A05 schedule for VT, still with the usual Antigua transmissions and nothing at Montsinéry (Kai Ludwig, Germany, *ibid.*) Appeared BBC would also no longer be on WYFR transmitter; see U S A (gh)

**BELGIUM** [non] Partial reprieve? RVI announced that although programs in English would end, there would still be news in English several times a day (Ed Stone, *DXLD*) Seven times a day (Larry Nebron, CA, *ibid.*) According to the French redaction, English news will be transmitted via Astra satellite only (JM Aubier, France, *ibid.*)

Wim Janssen, director of RVI, appeared on VOA *Talk to America* March 4. The cuts are not primarily for financial reasons, but for the survival of RVI in the next 5-10 years. There will be English news and features in text on the website, and in audio, headline news in English. RVI is in the same building as RTBF, but they barely talk to each other (gh)

RTBF via Germany, 17570 at 1804, slow-tempo tango-jazz with Arabian influence, and Breton reels (accordion or concertina), excellent signal, great music program (Eric Bryan, WA, *DXLD*) This relay of RTBF's domestic La Première radio service has been coming in well on 17570 from 1530 to 1830 (sometimes later) on weekdays. There's music in the half-hour beginning at 1530. After 1600, an hour-long "Dictionary Game" panel show. The 1700 hour is mostly news (including

all-important Brussels traffic reports), while more music creeps in during the 1800 hour. I enjoy this broadcast largely because it's a rare direct SW relay of a domestic European broadcaster (Mike Cooper, GA, *ibid.*) Perhaps all one hour earlier during DST (gh)

**BRAZIL** Due to ute interference on 3235, R. Guarujá Paulista has been assigned a new frequency, 3385, but first experimented with 3400; reports wanted (Sarmiento F. Campos, Rio de Janeiro, *condiglist*) radioguaraaam@radioguaraaam.com.br (Rudolf Grimm, SP, *bclnews.it*) 3400 heard at 2233-2314, international songs, TCs, slogan "Guarujá Paulista - A Rádio da Família!" (Carlos Gonçalves, Portugal, *Conexión Digital*) Since 3400 is on the boundary with the aero band, they might get some complaints (gh) From March 8 at 0230 heard on 3385 ex-3400, (Francisco Jackson dos Santos, *radioescutas*)

**CANADA** RCI Ukrainian service has been reduced much more than most people realize: no longer on SW, and only on cable around Kiev! And CBC president Robert Rabinovitch says the decision is "final." Staff at the service is in shock and doesn't know where to turn for support. Senator Raynell Andreychuk brought the issue up a number of times, as has the Ukrainian Canadian Congress. But everyone is trapped in a Kafkaesque bureaucratic nightmare [everyone passing the buck]. A popular daily radio program from Canada has been reduced to two half-hours: one on Saturday, one on Sunday. Weekend programs do not have newscasts, since they're pre-recorded on Fridays (Wojtek Gwiazda, RCI Action Committee)

**CHILE** For two weeks in February, the Portuguese service of Christian Voice at 0400-1100 was way off nominal frequency, 11890, instead monitored varying around 11801 and on some days around 11849. Finally returned to 11890 after I notified them in Miami (Wolfgang Büschel, Germany, *DXLD*) Why didn't they notice before that?? Or any of their target listeners? (gh)

**CHINA** Voice of the Straits, Fuzhou, 4940, heard with a program in English, *Focus on China*, Sat and Sun at 1430-1500; seemed to be mostly business related (Ron Howard, Monterey, CA, Walt Salmaniw, Victoria, BC, *DXLD*) see <http://www.vos.com.cn/enroot/> (Jari Savolainen, Finland, *ibid.*)

[non] CRI A-05 relays via Cërrik, Albania to ENAm: 0000-0157 English and 0200-0357 Chinese, all at 305 degrees with 2 x 150 kW transmitters in parallel (Observer, Bulgaria)

**CONGO** Maintenance and Renovation of Broadcast Station in Djoue. Overall Contract: A SW transmitting station including civil construction and equipment supply, installation and adjustment of 2 sets of 50 kW SW transmitters, 3 sets of antennas and feeders with transformer-switch, corollary equipment, electric generating set, distribution apparatus, air-conditioning, etc.: Under construction (China Radio & TV Corporation for International Techno-Economic Cooperation (CRTV) <http://www.crtv.com.cn/en/index.htm> via *DXLD*)

**CONGO DR** [non]. R. Okapi heard in French 0400-0600 on 11690, too strong to be their 10 kW transmitter; now relayed? (Walt

*All times UTC; All frequencies kHz; \* before hr = sign on, \* after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-05=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

Salmaniw, Victoria, BC, HCDX) Sounds too strong, too good an audio and too good a delivery (Don VE6JY Moman, Lamont, Alberta, ibid.) Good signal on 11690 with interviews, listeners questions about elections, music. Website <http://www.radiookapi.net> indicates they have a new 2-hour program at 0400 on 11690 covering the whole country (JM Aubier, France, DXLD) Informed source says it's via Meyerton, South Africa (Bernd Trutenau)

**CZECH REPUBLIC** Czech Radio has organized a unique reconstruction of the battle for the station against the Nazis in 1945, part of 60th Anniversary of the end of WW II. The re-enactment will last around 40 minutes, 7th May 2005 at 13 UT in front of the Czech Radio building on Vinohradská Street. No doubt the English service of R. Prague will also cover this (Jonathan Marks, Media Network blog) If live, at that hour on 21745, 13580 (via Michael Bethge via Wolfgang Bueschel via Andreas Volk via Alokesh Gupta)

**ECUADOR** HCJB has been recording and will soon be broadcasting programs in the Cofán language, for an indigenous tribe in the Amazon rain forest of Ecuador and Colombia, M-F as soon as radios fix-tuned to 6050 are distributed to the people (HCJB press) Time? Fixed-tuned radios are a common tactic of missionaries and North Koreans (gh)

**EGYPT** The head of the Egyptian Government, Dr. Ahmed Nazef, decided to replace the Media Minister, Mr. Mamdoh El Beltaagy, with the Youth Minister, Mr. Anaas El Feay. Hope the new media minister will reconsider ceasing some of Radio Cairo's overseas broadcasts (Tarek Zeidan, Cairo, DXLD)

**FINLAND** The YLE Radio Finland situation as of mid-Feb: Since June 2004 there has been public discussion about the future of international free-to-air radio in Finland. The major organization representing Finnish nationals abroad (Suomi-Seura, Finland Society) has underlined the view that reception of free-to-air radio from Finland is a "subjective" right of the expats. The organization, headed by former foreign minister and Labour Party chairman, Mr Pertti Paasio, has worked intensely on the matter. For example, they had some 30-thousand copies of a leaflet printed focusing on the cost to the consumer of (a) SW (b) mobile phone internet and (c) satellite services.

Then the Finland Society handed in a petition representing some 15,000 Finnish expatriates, to the chairman of the Parliamentary controllers of YLE, MP Mika Lintila. The issue became the high cost to the consumer of the use of mobile internet. Mr Lintila said that mobile phone internet probably cannot replace radio via shortwave.

YLE has made no decisions about the future of its SW. Current agreement concerning distribution with Digita/TDF runs out at the end of 2006. The popularity of Radio Finland amongst expats may be attributed to the fact that in the early '90s, R. Finland broke away from traditional international broadcasting formats and introduced continuous all-day flows of programming. Live domestic and international sports is a key attraction.

Within YLE, the future of SW and MW is an issue at the corporate level, not handled within the external broadcasting branch only. No decisions have so far been taken. In 2002 YLE closed all foreign language external services, except Russian and some small languages spoken in Russia. The closures did not arouse much protest, except to some extent from the German area. The reaction to the possibility of closing now Finnish and Swedish has been surprisingly vast and intense, and may be unique in recent expatriate media discussions, internationally. Radio Finland has not, repeat not been involved in these campaigns (Juhani Niinistö, YLE R. Finland, Media Network blog)

**FRANCE** DRM from Issoudun on 6175 heard from early March, scheduled 0700-1100, 1200-1900 and 2200-0600 (Kai Ludwig, Germany, DXLD) Now no chance to hear anything +/- 20 kHz from 6175 here in Europe (Wolfgang Büschel, ibid.) Another racket to contend with on 49 mb, S9+15db with lots of hash each side, and even audible on 6190 (Noel R. Green, UK, BC-DX)

**GEORGIA** R. Georgia, from late February on 11805.00 exactly, for the first time in years; formerly 70 to 140 Hertz above; and well-performing audio, minimally distorted, but tolerable. Maybe the technicians at Dusheti overhauled the equipment recently. Same for 11910.00 English at 1030, also scheduled at 0930 (Wolfgang Büschel, Germany, BCDX, DXLD)

**GERMANY** [and non] DW A-05 English, nothing to NAM, of course, but selected frequencies for elsewhere that we may hear: 0000-0100 9825; 0400-0500 7170, 11945; 0500-0600 9630, 9700, 15410; 0600-0700 7170, 15275, 17860; 1600-1700 17595; 1900-2000 13780, 15520; 2000-2100 11865, 13780, 15205; 2100-2200 9440, 11865, 15205; 2200-2300 9720; 2300-2400 9890 (gh, from sked via Alokesh Gupta, India, DXLD)

[and non] Jewish leaders expressed relief after a federal court judge ruled that Ottawa was free to deport infamous holocaust denier Ernst Zundel back to his native Germany. He had been in solitary confinement in a Toronto jail for the past two years on a national security certificate signed by Canada's solicitor general and the federal minister of citizenship and immigration (CTV News via Fred Waterer, DXLD) At 2100 UT March 2, Ernst Zundel arrived at Frankfurt. He was arrested and brought to Mannheim for further proceedings (Kai Ludwig, Germany, ibid.) Zundel had a program, Voice of Freedom via WRNO, New Orleans, heard Feb 28, 1994 at 2200-2230 on 15420 and QSLed with a raft of Neo-Nazi propaganda (Edward Kusalik, AB, ODXA)

**GREECE** [non] V. of Greece A-05 via US relays: Delano: 15190 0600-0800

296° (Sat & Sun 0600-0700); 9775 1200-1500 075° (Sat and Sun 1200-1600); 17705 1600-2200 075°. Greenville: 17565 2000-2200 164° (Ch. Charalampopoulos, ERT, via John Babbis, DXLD)

**GREENLAND** KNRR, 3815-USB, heard on our DXpedition between Venice and Trieste with a 450 m beverage aimed 330 degrees, at 2137-2214, talk in Danish recorded and confirmed by Anker Petersen (Alessandro Gropazzi, et al., DXLD) Also recognized the voice of the newreader relayed from Denmark at 2200 (Petersen, DX Window) KNRR Tasilaq presumed the one on 3815.00 USB from 2103 to 2215\*, also heard by Noel Green (Mike Barraclough, UK, DXLD) Also heard from 2100 well past 2200 on two occasions (Jan Edh, Sweden, SW Bulletin)

**GUIANA FRENCH** DW and BBC relays were supposed to move here for A-05; but in February, the Montsinéry site was reported with numerous problems relaying the stations it already had - audio dropouts, totally missing broadcasts of RFI and R. Japan (Thierry Fricot, México, Roman Mora, Costa Rica, and Adán González, Venezuela, DXLD; Célio Romais, Brasil, condiglist) See ANTIGUA

**IRAN** IRIB A-05 English, all 500 kW, from K=Kamalahad or S=Sirjan sites, with azimuths: 1030-1130 15600-K-100, 17660-K 109; 1530-1630 9635-S-105, 11650-K-100; 1930-2030 7205-K-304, 9800-S-211, 9925-K-205, 11660-S-313, 11670-K-304, 11860-S-313; 0130-0230 9495-K-336, 11875-S-328 (via Swopan Chakroborty, DXLD)

[non] R. Seda-ye Mellat-e Iran (V. of the Iranian Nation)'s move to 11620 at 1430-1500 did not last long; in late Feb heard on 11625 getting it away from India 11620 and out from under WYFR 11615 skirts (gh) In early March had moved again up to 11630.16 to avoid Iranian jammers but had been followed with generator engine type jammers on 11630 and 11632.68, but a lonely 'forgotten' bubble jammer on 11624.00; jammers may start a few minutes late (Wolfgang Büschel, BC-DX)

**KUWAIT** Ministry of Info, excellent reception on 11675 in DRM, but unfortunately bit rate so low, 11 kbps, with 5 kHz audio no better than an analog MW station; at least there no fading or variation in S/N ratio (Marcus, PY3CRX/PY2PLL, São Paulo, @rividade DX) B-04 schedule was 2200-0200 in Arabic, 350 degrees, 500 kW. IBB plans to install a fourth SW transmitter here, this one on the tropical band for Afghanistan (gh)

**LAOS** [non] The Hmong Lao Radio broadcast to NAM via UK Wed & Fri 0100-0200 on 6040 was replaced by Sat 1300-1400 & Sun 1400-1500 via WHRI South Carolina on 15105, hmuch better reception here and no doubt in Hminnesota where the station is based. Included some very rustic hmusic, like a badly tuned wooden horn, toward the end of the hours (gh, OK) !! Ceeb toom !! Xov tooj cua Hmoob Losuws ncuu kev nthuav tawm huab cua nyob rau sab tebchaws America tau hloov mus rau SW2 15, 105 kHz raws cov sijhawm nram qab no lawm (HLR website, mentioning MI, FL, NC, SC, AR, MN, WI, CA, Hmong strongholds)

**LITHUANIA** R. Vilnius English on 7325 to NAM heard at 0130-0200 (Eric Bryan, WA, and Brian Alexander, PA, DXLD) Had been at 2330, but leapfrogged the repeat at 0030 on 9875, for late B-04 anyway (gh)

**MADAGASCAR** Pres. Mark Ravalomanana, who attends the Presbyterian Church, was to visit the US in Feb, accompanied by leaders of World Christian Broadcasting, whom he had invited to set up a SW station at Mahajanga on the NW coast. Plans are developing for antennas to blanket Africa, South America, the Middle East, India, Indonesia, southern and western China and European Russia with the gospel. Some confusion arose over the exact location of the land, but the issue was quickly resolved, with World Christian getting the land best suited for construction of radio towers. "The Malagasy people have great respect for written documentation," said Kevin Chambers, Director of Engineering. Even during the years of communist rule, the property rights of Radio Netherlands, which has a SW facility near Antananarivo, were respected by the regime. The Madagascar facility will be similar to the one in Anchor Point, Alaska, in that it will be a transmitting site. Production of programming will continue in Franklin, TN. Program CDs will be shipped to Mahajanga via international courier. The next order of business is to hire a security staff, dig wells for water, install a fence, and obtain electrical power (WCBC)

**MÉXICO** R. Huayacocotla, created in 1965, has finally been granted an FM license after 25 years of waiting (Notimex, mid-Feb via Héctor García Bojorge, DF, condiglist) This could be the beginning of the end for 2390 kHz, an assignment considered to be only slightly better than nothing. Let's hope they keep it once the FM is going (gh) 2390 is either off the air or running a very erratic schedule. I did not hear them one time while I was in Central America in February (Harold Frodge, MARE Tipsheet)

The Riz DRM transmitter is still at R. Educación, since the DRM Consortium reached an agreement with the Ministry of Communications to do more detailed 26 MHz tests both with Radio Educación and with the CIRT (the association of commercial R&TV stations). They have permission to leave the transmitter in México till July 31 (Jeff White, FL, DXLD) Monitor 25620

R. Educación (analog), 6185, is sometimes in the clear around 0600-0700, after China/Sackville 6190 closes, when Brazil relents, and when propagation from Vatican is not so good, but why not for its entire 12-hour overnight broadcast? Part of the problem is the official Mexican view of SW, which is just like AM and FM: each station has one specific assigned frequency, in use forever, with no possibility of moving as needed to avoid interference. This is totally out of touch with the actual situation on the SW bands. Quite possibly even the Mexican SW stations don't realize they should insist on frequency flexibility (gh)

Glenn, you're right that the problem lies with the government authorities who don't understand that SW stations need to change frequencies. And you're right that the stations themselves don't even understand this need, nor do they ask the authorities for the right to do so. A large part of the problem is that most of these stations' transmitters have fixed frequencies. They are assigned a shortwave frequency by the government, then they go and buy a fixed-frequency SW transmitter tuned to that frequency. R. Educación and R. Mil are now at least in the HFCC master lists, and they do show up as "collisions" with the larger frequency-agile stations (Jeff White, FL, DXLD)

**NEW ZEALAND** RNZI A-05 until 1 May, when further changes are expected, azimuth 0 u.o.s.: From 0459 11820; 0706 9885; 1100 9885 325; 1300 6095; 1651 6095 35; 1851 9845; 1951 11725; 2051 15720 (via Alokesh Gupta, DXLD)

**PAPUA NEW GUINEA** I asked Joe Emert for another update on the planned Wantok Radio Light project, 7120; they were behind schedule. Target date now in from late May to early June, with Celebration of the commencement of shortwave planned for June 11 (Guy Atkins, WA, DXLD)

**PORTUGAL** RDPI plans: second 300 kW Thalès transmitter delivered this year and to be put into service very soon; third 300 kW Thalès transmitter commissioned, possibly in operation by Oct '05; two new Thalès antennas ordered, one intended for NAM coverage (Carlos Gonçalves, Portugal, DXLD)

**SAUDI ARABIA** A big buzz of slightly oscillating pitch is way atop BSKSA Holy Qur'an Service on 21460, at 1510 past 1530, a malfunctioning transmitter, not jamming or some external interference. No such problem on the French service, 21600. 21460, again another day with huge buzz over audio making it unlistenable, at 1445 and still at 1510 (gh) Same transmitter with same buzz earlier at 0900-1155 on 21495 and before that with first program at 0600-0855 at 17740 (Wolfgang Büschel, harmonics yg)

**SOMALIA** R. Galkayo, 6980, uses a ham transceiver, into an aging amp at 100 watts, all in a small room, like a pirate. I found no evidence of the reported relay on 9615 in Bassaso. There are only three SW stations being heard in Somalia, the others being R. Mogadishu 6960, and R. Hargeisa 7530. The 40/41 mb is full of rogue radiotelephone setups, and I have heard several RT operations on 20/31/49 mb, a terrible trend (Joe Talbot, Somalia, DSWCI DX Window)

**SUDAN** [non] Sudan Radio Service (Nairobi studios, VT Merlin transmitters) announced this A-05 schedule, M-F: 0300-0500 on 11665, 0500-0600 on 15325, 1500-1800 on 17660 (Chris Greenway, Kenya, DXLD) Via UK?

**TAIWAN** Fu Hsing, 3rd program, 15250 heard from 1100, jammed by a siren sound. On 15250 before 1100 is CRI in Chinese via Kunming, but the siren jammer is already on (Mauno Ritola, Finland, HCDX) Nothing but the jammer heard here at 1100, 1235 (Zacharias Liangas, Greece, DXLD) QSL card in Chinese and English after 31 days for my report in Chinese, signed by Mr. Xieyi Zhao, Station Manager. Memory card box, paper knife, and key holder enclosed as souvenirs. He says SW broadcast on 15250 has continued since August 23, 1993, with 10 kW for communication between Taiwan and mainland; welcomes reception reports in English or in Chinese; no reply postage is required. Address: 5, Lane 280, Sec. 5, Chungshan North Road, Taipei 111. URL: <http://www.fhbs.com.tw> E-mail: [fushinge@ms63.hinet.net](mailto:fushinge@ms63.hinet.net) Fu Hsing means "rehabilitation" or "reconstruction" in Chinese (Takahito Akabayashi, Japan, DXLD)

**TURKEY** VOT A-05 English: 0300-0350 6140 7270; 1230-1320 15225 15535; 1830-1920 9785; 2030-2120 7170; 2200-2250 9830 (Ob-server, Bulgaria)

**UGANDA** R. Uganda, 4976, 5026, 7110 and 7195 all active, but irregular. I suspect that neither transmitter has been running at full listed 10 kW for several years. The one on 4976/7195 is noticeably weaker than that on 5026/7110 and is poorly modulated (Chris Greenway, Kenya, DXLD)

[non] from March 1, R. Rhino International Africa temporarily suspended transmission. However, RRIA maintains news updates on our website <http://www.radiorhino.org> (via Alokesh Gupta, DXLD)

**UKRAINE** On 7440 at 0442 UT Sun, Radio Ukraine International, wonderful S9 + 10 reception, mailbag with lovely music of the Orange Revolution. For Ukrainian speakers, these lyrics never fail to bring a lump in my throat, and tears to my eyes. Beautiful music and very frank, almost apologetic talk in English about not telling the real story in Ukraine before the revolution (Walt Salmani, BC, DXLD) English now at 0000 & 0300 on a higher frequency? (gh)

**UK** At presstime, there was contradictory information about A-05 BBC relays audible in NAM; see ANTIGUA, GERMANY, GUIANA FRENCH. WYFR originally planned to have BBCWS at 0000-0300 on 11835, but this was replaced with their own programming. However, one VT A-05 schedule still showed 11835 for BBC, followed by another two hours from a secret site, presumably Delano as before (gh)

A government Green Paper suggests BBC World Service undertake a "radical and creative reprioritisation of its vernacular output" which is 42 languages. The 8 languages it currently has online websites for – Arabic, Chinese, Hindi, Persian, Portuguese, Russian, Spanish and Urdu – should be the starting point for the discussion. BBCWS in 16 languages spoken in the former Soviet bloc is beginning to look anachronistic (Mike Barraclough, UK, DXLD) For example, BBC is hogging FM frequencies in the Czech Republic, but the Czechs will never get such an opportunity

in the UK! Time for the BBC to celebrate 60 years of broadcasting to Eastern Europe and retire. There are other areas where it could have far more of an impact (Jonathan Marks, *Critical Distance* blog)

**UNITED NATIONS** [non] UN Radio, A-05 in English: M-F 1730-1745 on 7150 via Meyerton, 100 kW, 5 degrees to Eaf; 15495 via Skelton UK, 300 kW, 110 degrees to ME; 17810 via Ascension, 250 kW, 65 degrees to W/Caf (VT schedule via Michael Bethge via Wolfgang Bueschel via Andreas Volk via Alokesh Gupta)

**USA** WRNO New Orleans planned to start testing a new 100 kW transmitter by March 1, 15420 daytime, 7355 nighttime; now owned by a church (George Thurman, TX, WORLD OF RADIO) Had been silent for years, but hardly eagerly anticipated; still no sign of it by mid-March (gh) FCC shows: Good News World Outreach, WRNO, 5601 Bridge Street, 3rd Floor, Fort Worth, TX 76112. Outdated station website <http://www.wrnoworldwide.org/index.html> had nothing about this, but a different address: WRNO Worldwide, c/o Good News World Outreach, P. O. Box 895, Fort Worth, Texas 76101, 817.850.9990 Office, 817.850.9994 Fax, [hope@goodnewsworld.org](mailto:hope@goodnewsworld.org) but e-mail bounced; plus imaginary program schedule on 7395 at 2300-0300, even tho 7395 is not authorized until after 0300 when WYFR comes on 7355. B-04 schedule, likely similar to A-05: 2200-0300 7355, 0300-1600 7395, 1600-2300 15420. That gives them option of using either 15420 or 7355 during the 2200-2300 hour (gh)

We're having trouble operating on 15725, and FAA Atlanta complained about our use of 6870, saying it is a 24-hour emergency channel for them, and they want us to abandon it completely. Of course the FCC had checked the frequency out for us and approved it. But since it's out of band, utility stations have preference, so we have to move, back to 7385 and expanded to 1300-1000, the other three hours still on 9955 (Jeff White, WRMI, early March)

Progress on our own recently acquired transmitter has been slow due to transit delays and poor weather conditions; however, we hope to have some good news by mid-April. Meanwhile, Europa Radio International begins broadcasting via WRMI Miami March 20, Sundays 1800-2000 on 7385, and Wednesdays 1000-1200 on 9955 to Caribbean [as DST shifted] (Alan Day, Europa Radio International, <http://www.europaradiointernational.co.uk/>)

Glenn: We are testing 15190 at 1730 March 4 with a new rhombic antenna, making RF human exposure measurements, and testing for any signs of meltdowns (Dave Frantz, WWRB) Inaudible here; no doubt hoping to glom onto BBCWS audience after it closes, and despite Equatorial Guinea also on 15190 (gh)

**URUGUAY** [non] Checking for R. Cimarrona, on a Sunday in mid-Feb at 2245, no trace of it on 9480 via Germany, not even a carrier; so the station appears to be gone. Was Sun & Mon only, 2200-2300 (gh)

**VANUATU** R. Vanuatu, 7260.17, stayed on after dark, heard between 0950-1120, and during the 1000-1100 hour, a ten-minute tape loop with a Polynesian song followed by male speakers played over and over. Stronger another night at 0842-0950, peaked around S8 using 7.2 MHz delta loop, though it was a more quiet copy on the big inverted L. Female announcer played pop and light Polynesian music with "Radio Vanuatu" mentioned multiple times in local dialect. Terrible QRM from DRM transmission just up frequency [DW Wertachtal, Germany, 7265, 200 kW non-directional], so best heard in LSB or by switching to narrow filter and tuning down slightly. Spectrum pollution from the digital transmission took a full 10 kHz bandwidth, faded almost completely out by 1000. Also a very weak carrier on 3945, but nothing audible (David Hodgson, TN, DXLD) Very strong signal on 7260 at 0630; also audible on 3945 by 0940 (Craig Edwards, Queensland, *ibid.*) WRTH 2005 says they have nominal 10 and 2.5 kW SW transmitters, so which is which? Hope they leave 7260 on at night, even with 3945 going (gh)

**ZANZIBAR** Neither 6015 nor 11734 heard. Not active on SW at present, I suspect (Chris Greenway, Jan-Feb, Nairobi, Kenya, DXLD)

**ZIMBABWE** [non] As the March 31 elections approached, opposition station SW Radio Africa was hit by more and more jamming. Added a MW frequency, 1197, presumably Lesotho, at 0300-0500 (gh) But in Zimbabwe that faded out before the first hour. That transmission also via South Africa on 3230; 1600-1900 on 6145, jamming became extreme, so moved to 4880, but also jammed. Jamming appeared to be coming from the ZBC site at Gweru, in Central Zimbabwe (David Pringle-Wood, Zimbabwe, DXLD) 3230 weak but audible from 0301 (Scott R. Barbour, Jr., NH, *ibid.*) 3230, 0315-0345+ poor in noise and slight co-channel QRM from numbers station on high side (Brian Alexander, PA, *ibid.*) SWRA announced it would use both 3230 and 6145 at 1600-1700, 3230 1700-1900 (via Mike Terry, DXLD)

Two jammers could switch among the three frequencies in minutes. Then SWRA added a third frequency at 1600-1700, 11845 via Ascension. Check <http://www.swradioafrica.com> for latest (David Pringle-Wood, Harare, DXLD) Zimbabwe also stepped up jamming before elections three years before (Wolfgang Büschel, Germany, DXLD) 11845 with nice signal at 1622 (Jari Savolainen, Finland, *ibid.*) Would be interesting to know if ZBC is on SW when SWRA is jammed. If not, while two frequencies jammed, we should know how many transmitters are there in working condition at Gweru and how many // frequencies SWRA will need (Thorsten Hallmann, Germany, *ibid.*)

Until the Next, Best of DX and 73 de Glenn

### 0000 UTC on 3249.8

HONDURAS: Radio Luz y Vida. Christian songs to promo and ID to local time check. Greetings and special thanks to **Radio Sonagera** 1250 AM for relaying their programming. Honduran **HRMI** 3340 at 0100. (Fernando Garcia, Baltimore, MD)

### 0041 UTC on 5019.91

PERU: Radio Horizonte. Spanish music to regional time check and ID, "por las ondas de Radio Horizonte...para todo el Peru." (Arnaldo Slaen, Buenos Aires, Argentina) Peruvians monitored: **Radio Huancabamba** 6536.15, 0055-0111; **Reina de la Selva** 5486.7, 1028-1043; (Scott Barbour, Intervale, NH) **Radio Tarma** 4775, 0125-0148 with Spanish ads and IDs. (Gayle Van Horn, NC)

### 0200 UTC on 7180

RUSSIA: Voice of. News on Ukrainian political scene to segment on Czar Peter the Great. Folk music to interval signal. Station ID to news service. Reception easier than previous night's propagation. (Dan Malloy, Everett, MA; Roger Nash, Heber Springs, AR)

### 0338 UTC on 4775

SWAZILAND: Trans World Radio. Sign-on IDs and announcements in listed Lomwe programming. Audible 3240, 0340-0347\* (Rich D'Angelo, Wyomissing, PA/NASWA Flash Sheet) Audible 9500, 0500-0510 with religious format with moderate signal amid utility interference, // 6120. (Jim Evans, Germantown, TN/NASWA)

### 0356 UTC on 4915

BRAZIL: Radio Anhanguera. Lite vocal music to full identification and Portuguese station promo at 0402 with mentions of Macapa. SIO 433. Brazil's **Radio Nacional** 4915, 2250-2333+; **Radio Record** 6149.8, 0750. ID and mentions of Sao Paulo to religious format. (Garcia, MD) **Radio Nova Visao** 5965, 0900 with **Radio Transmundial** relay; **Radio Cult-Ondas Tropicais** 4845 at 1001. (Garcia, MD); **Radio Guaraja** 3235, 0925; **Radio Alvorada** 2460 at 0910. (Alvin Mirabal, Puerto Rico) **Radio Inconfidencia** 6010.2, 2232-2240. (Arnaldo Slaen, Buenos Aires, Argentina).

### 0450 UTC on 7290

SAO TOME: VOA relay. *Music Time in Africa* focusing on pop music's African musicians. ID/freq at close of transmission //6080 weaker //4960 poor. (Evans, TN)

### 0830 UTC on 6080.6

BOLIVIA: Radio San Gabriel. Spanish/Aymara. Sign-on into taped religious crusade. Andes flutes to Spanish sermon. **Radio San Miguel** 4902.22, 935-1030 (Robert Wilkner, Pompano Beach, FL/DSWCI); **Radio Pio Doce Llallagua** 5952.5, 1000 with news and promos. (Garcia, MD) **Radio Mosej Chaski** 3310, 0935 (Mirabal, PR) 3310, 2323-2336. (D'Angelo, PA)

### 1126 UTC on 4925

INDONESIA: RRI-Jambi. Indonesian. Talk to traditional station interval signal at 1130. Half-hour updates to resumed Indo music program. **RRI-Pontianak** 3976, 1115-1137 (Frank Hillton, Charleston, SC) **RRI Jambi** 4925, 1113-1137 Poor/fair for Indo and Koran recitations. **RRI-Fak Fak** 4789.98, 1111-1130. (Barbour, NH)

### 1135 UTC on 3260

PAPUA NEW GUINEA (New Guinea Territory) Radio Madang. Program of vocals music to English/Pidgin script. Poor to fair signal quality. PNG's monitored; Papua Territory-**Radio Southern Highlands** 3275, 1155-1218; Admiralty Islands-**Radio Manus** 3315, 1142-1153; Bougainville Islands-**Radio Bougainville** (tentative) 3325, 1200-1201\*; New Ireland-**Radio New Ireland** 3905, 1143-1215; New Guinea Territory-**Radio Simbu** 3355, 1200-1205\*; New Britain Island-**Radio East New Britain** 3385, 1210-1235; Papua Territory-**Catholic Radio Network** 4960, 1228-1256. (D'Angelo, PA)

### 1228 UTC on 7185

BANGLADESH: Bangladesh Betar. English service sign-on interval signal. Station ID and "tinny" fanfare tune into news. Rough copy but able to detect Asian news briefs. National cultural program at

1244 to regional news. Poor signal although better than it was earlier this season. (Barbour, NH)

### 1246 UTC on 9525

POLAND: Radio Polonia. German service to 1255, followed by interval signal intro for English service at 1259. Poor signal for identification and national news at 1300. (Barbour, NH)

### 1615 UTC on 13675

CANADA: Radio Austria Int'l relay. Great signal for *Report From Austria* program (Bob Fraser, Belfast, ME; Nash, AR)

### 1942 UTC on 11585

ISRAEL: Kol Israel. News and interviews on the Holocaust. Monitored on 6280, 2016 with news update on aid to Sri Lanka tsunami victims. (Fraser, ME) **Galei Zahal** 6973, 2140+ in Hebrew. (Harold Frodge, Midland, MI)

### 2149 UTC on 5030

BURKINA FASO: Radio Burkina. French talks to African high-life and pop vocals. ID to news and sports update. Fair signal with only minimal fading. (Tom Banks, Dallas, TX; Frodge, MI)

### 2216 UTC on 4915

GHANA: Radio Ghana. Male DJ format with English phone calls to rap music. Male/females news and remotes to "the news comes to you from Radio Ghana." (Frodge, MI)

### 2230 UTC on 6165

CHAD: Rdiffusion Nationale. Vernacular text into African light music and few talks. Interference from Croatia, which is perhaps not such a problem to European DXers in skip zone. Fair signal quality. (Carlos Goncalves, Portugal/DWSCl) Additional African's logged as; **Benin**-Radio Parakou 5025, \*0457 with anthem, "ici Parakou, station ..." with mention of freqs and time for weak signal. **Botswana**-VOA relay 4930, 0435-0445 //4960, 6080, 7290, 9575. (Anker Petersen, Skovlunde, Denmark/DSWCI) **Morocco**-RTV Marocaine 15345, 1754 Arabic; **Morocco**-VOA 14240, 1743 English; **Gabon**-Afrique Numero Un 15475, 1802 French. (Mirabal, PR) **Angola**-Radio Nacional 4950, 2119-2139. (Barbour, NH)

### 2253 UTC on 7295

MALAYSIA: Radio 4/Radio Malaysia. Easy listening and lite pops to "Radio 4" spot. Tentative Radio Malaysia ID before news at 2300. (Frodge, MI)

### 2300 UTC on 4845

MAURITANIA: Radio Mauritanie. Presumed news service in Arabic to traditional music at 2315. Good signal bothered by fading, SINPO 34333. (Evan, TN; Frodge, MI)

### 2326 UTC on 9800

CANADA: CBC. Deutsche Welle DRM English broadcast via CBC, language lesson and ID. Radio Sweden DRM English via CBC with *Studio 49* program. Reception excellent (digital reception is either excellent or non existent, there is no in between). Using NRD-545 receiver set to -5 kHz of desired frequency, USB, BWC 9.99 kHz and +2.30 PBS. Using phone out from receiver to PC sound card line-in. Running Dream version 1.17 (precompiled sharware) on PC. (Kraig Krist KG4LAC, Annandale, VA) Kraig, thanks for the DRM log -GVH

### 2333 UTC on 7125

GUINEA: Radio Nationale du Guinee. French promo for "Histoire de la Guinee," plus ID as "Radio Nationale du Guinee" to national anthem and sign-off. SIO 343+. (Frodge, MI)

### 2342 UTC on 6856

PIRATE: The Crystal Ship. Nice mix of music by the Poet. Music included several tunes by the Romones, Warren Zevon and the Stones (*Paint it Black* and *Under Your Thumb*) from 23456-0000. Station identification "you are on board the Crystal Ship, plundering the airwaves." First log on this frequency. (Joe Wood, Greenback, TN)

Thanks to our contributors – Have you sent in YOUR logs?  
Send to Gayle Van Horn, c/o Monitoring Times (or e-mail gaylevanhorn@monitoringtimes.com)  
English broadcast unless otherwise noted.

## The Spring-Summer Catalog (A05) - Part 2

**A**s stated last month, this is most definitely a work in progress. Whether it continues to progress is entirely up to you, the reader. If you think this effort has value and would like to see it updated monthly on the MT web site, as well as published seasonally in the magazine, write in and tell us...us being me the author and the editor, "my boss." Addresses (e-mail and otherwise) are on the index page.

Next month, we'll key on the U.S. international broadcasters.

### Formatting:

Since international broadcasting encompasses other media beyond shortwave, references and information for them have been included — **sw** is shortwave; **i-net** is internet audio; **wrn-na** is World Radio Network, North America stream (also available on Sirius stream 115). Day of week abbreviations correspond to those used in MT's *Shortwave Guide*, which is where you will find the **sw** frequencies for these programs. All times are UTC/GMT. ' is minutes, e.g., 60'.

### The List

#### ALBANIA

R. Tirana [rtsh.sil.at/foreign.htm](http://rtsh.sil.at/foreign.htm)

sw: T-A 0145 (15'), 0230 (30') - News, a few reports and folk music.

#### ARGENTINA

RAE <http://www.radionacional.gov.ar>

sw: 0200 (60', T-A only)

Fixed programs : :00 News & current affairs reports; :40 H DXers' Special, A DXers' Supplement; :50 Sport Report. Also, considerable local music interspersed, including tangos.

Optional features at indeterminate days & times - Science & Technology, Argentina Exports, Cultural Agenda, Knowing Argentina, Ephemerides (personalities).

#### AUSTRALIA

R. Australia <http://www.abc.net.au/ra>

sw: 24/7 service targeting Pacific and Asia. Some portions audible in NA. Reception is better in WNA.

News - on the hour and Asia Pacific (regional current affairs): S-H 2305, M-F 0130, 1005, 1305, 1505. Asia Pacific Review (weekend roundup) F 1905, 2305, A 0805, 1105. AM (morning report): S-H 2110, 2210. The World Today (midday report): M-F 0210. PM (evening report): M-F 0810, 1410. Correspondents Report A 1805, 2305, S 0805. Dateline Pacific (from RNZI): S-H 2130; M-F 0630. Perspective A 1655, 2005, S 0005; S-H 2255, M-F 0855. Correspondent's Notebook A 1205, 2055, S 1355. On the Mat (Pacific issues): M-F 0535, 0735. Asia Pacific Business: F 0615; A 0030, 1005.

Magazines - Pacific Beat: morning ed. S-H

1810, evening ed. M-F 0510. Pacific Review: F 1805, A 0005, 1035. In the Loop S-H 2330. w/excerpts repeated S 1705; M-F 1730. Australian Express F 1830, 2330, T 1330. Australia All Over A 1830.

Music - Keys to Music (enjoying the classics): F 0405. Margaret Throsby (w/interview): I A 1005, 1605; II S 1605. Saturday Night Country: A 1210. The Music Show: S 0905. Hit Mix: A 0730. Jazz Notes: A 0830.

Info - AWAYE! (Aboriginal) T 1105. Science Show A 1405, T 0410. National Interest: (politics) S 1505, M 1105. Background Briefing (documentary) S 0005, H 0410. Hindsight (history) F 0010. Health Report M 0331, 1030, 1530. Law Report T 0331, 1030, 1530. Religion Report: T 0331, 1030, 1530. Rural Reporter: W 1710, F 1930. Saturday Breakfast: F 2230. Late Night Live (perspective/interviews): M-H 1205; "Best of" F 1205, A 1705. The Europeans: H 1105. Books & Writing: H 1130. All in the Mind: W/A 1130. Education Series: W 0405, 1105; H 1330, 1705; S 0830. Encounter (religion): S 1305. Spirit of Things (spirituality): A 2205; S 1205. Innovations: A 2330; S 0730; M 1330, 1705; W 0430. Australia Talks Back (national phone-in): M-F 0910, 1605. Sunday Profile (interview): S 1105. Speaking Out (Aboriginal affairs): S 1130. Talking Point (interviews): S-H 2240; M-H 0615; A 1020. Perspective (comment): S-H 2255; M-F 0855, 1655. In Conversation (science): M 0315. Big Ideas: M 0405, F 1705. Ockham's Razor (science): T 0315. Lingua Franca (language): W 0315. The Ark (religious tradition): H 0315. The Arts: H 1130, F 1330. Movie Time: H 1105.

Sport - Grandstand (live action) A/S 0105-0730. Sports Factor: F 0331, 1030, 1530; S 1730. Reports: M-F 0305, 0610, 0730, 1405; S-H 1830, 1930, 2030.

Media/DX - Media Report: T 0331, 1030, 1530.

i-net: 24/7 live stream; as sw sked w/alternative programs b/c during Grandstand. Most programs available as audio on-demand w/archive, many with transcript.

wrn-na: 0000 A AM, S Books & Writing; 0700 S Education Series, M-F PM, A Asia Pacific Review. 0730 S Innovations, A Verbatim. 1100 S Correspondents Report, M-F Asia Pacific, A Pacific Review; 1130 S Sunday Profile, M Health Report, T Rural Reporter, W Religion Report, H Media Report, F Sports Factor, A Australian Express; 1930 S Pacific Review, M-F Pacific Beat (25'), A All in the Mind.

cbco: local times - M-F 0230, 0505; A/S 0505. (all 30').

#### BULGARIA

R. Bulgaria <http://www.bnr.bg>

sw: (60') 2300, 0200

:00 D News; :10 S/M\* Views Behind the News, T-A\* Events and Developments; :20 S\* Keyword Bulgaria, M\* Folk Studio (music), T\* Sports, W\* Magazine Economy, H\* The Way We Live, F\* History Club; :30 S\* Answering Your Letters, M-F\* Keyword Bulgaria, A\* DX Program; :40 M\* Walks and Talks (places), T-F\* Timeout for Music; :45 S/A\* Timeout for Music. \*UTC one day earlier in 2300 broadcast.

i-net: available as audio on-demand and as program transcript, both archived.

#### CANADA

CBC N. Quebec <http://www.cbcnorth.ca>

sw: 1200-0605 on 9625. Intended as a local radio service for the communities of northern Canada, especially Quebec and Nunavut, not served by a local transmitter. Relays some CBC Radio One and CBC Premiere Chaine programming, as well as news and programs in Inuktitut and Cree. On major Canadian holidays, relays CBC Radio One exclusively.

#### CROATIA

V. of Croatia <http://www.hrt.hr/hr/glashrvatske>

sw: the international program of Croatian Radio, primarily for Croats abroad. Broadcasts mainly in Croatian 2300-0600 to NAm on 7285 kHz. News in English:

inet: 24/7 mainly in Croatian.

#### DENMARK

Banns R. Int. <http://www.euroaudio.dk>

inet: weekly Copenhagen Calling available on-demand; also, other content.

wrn: (30') S 0530, 1730 - Copenhagen Calling (magazine)

#### ECUADOR

HCBJ <http://www.hcjb.org.ec>

sw: D 1100-1300: Christian evangelical and religious programming.

Media/DX: DX Partyline A 1230.

inet: HCBJ World Radio Audio News (archived weekly) and Beyond the Call, available on-demand.

#### FRANCE

RFI <http://www.rfi.fr>

sw: English to Africa and Asia only. Best reported reception in NAm are for the 1600 (90') and 0600 (30') broadcasts to Africa.

inet: All English transmissions available in streaming audio, live and on-demand.

#### GERMANY

DW <http://www.dw-world.de>

sw: English to Africa and Asia only. Best reported reception in NAm are for the 2100 (60') broadcast.

inet: 24/7 in English. All newscasts and feature programs available on-demand.

wrn: 1400 M-F News and Newslink (news mag).

#### IRAN

V. of Justice <http://www.irib.ir/worldservice>

sw: D (60') 0130 - News and political commentary on Mideast current events.

inet: transmissions available in live streaming and on-demand audio.

#### IRELAND

RTE <http://www.rte.ie>

inet: 4 networks (3 in English) 24/7.

wrn: 1300 (60') S This Week w/Gerald Barry, M-F Marian Finucane (interviews), A Playback (best of RTE); 1800 & 2100 (30'ea.) M-F 5-7 Live (news mag), A/S Sports Results.

## ISRAEL

**Kol Israel** <http://www.israelradio.org>  
sw: D (15') 0530, 1130, 1930; (25'): 2100. (All newscasts)

**inet:** Most recent English newscast available on demand. Live audio stream of all international broadcasts, including domestic relays. News in text.

**wrn:** D (25') 0030 & 0530: (Rebroadcast of previous day's 2100 newscast.)

## ITALY

**RAI** <http://www.rainternational.rai.it>  
sw: D 0055 (20'): News.  
**inet:** 24/7 two audio channels in Italian only.

## JORDAN

**R. Jordan** <http://www.jrtv.com>  
sw: (210') D 1400. English broadcast, a relay of Amman's English mw service, consists mainly of news, pop music and some feature programming targeted at western listeners. (The sw broadcast is almost entirely blocked by RTTY interference on-frequency and the inet site was inaccessible at press time.)

## KOREA, DPR

**V. of Korea** (no internet)  
sw: D (30') 1300, 1500. (Reception better in wNA.)  
Program consists of political tracts and local martial and patriotic music of a nature reminiscent of Cold War-era broadcasts from hardline regimes in closed societies.

## LITHUANIA

**R. Vilnius** <http://www.lrt.li>  
sw: (30') D 2330 and 0030. Program consists of news, comment and analysis, politics, the arts and cultural events, accounts of everyday life, and Lithuanian music.  
**inet:** News in text format.

## NEW ZEALAND

**R. New Zealand Int.** <http://www.rnzi.com>  
sw: 24/7 service targeting the Pacific. Portions audible in NAM (as below). Reception is better in wNA.

**News:** on the hour; with **Pacific Regional News** M-F 0000, 0300, 1300, 1500; **The Week in Parliament** S 0012, 0730; **Spectrum** S 0034; **Midday Report** M-F 0000; **Checkpoint** M-F 0500, 0700; **Pacific Correspondent** H 0830, 1330, 1530, F 0330; **Worldwatch** M-F 0607; **Pacific Report** M-F 0620; **The Letter** M 0630; **Insight** M 0906; **Late Edition** M-F 1005.

**Magazines:** **Dateline Pacific** M-F 0308, 0808, 1308, 1508; **In Touch with NZ** (variety) M-F 0106; **Tagata o te Moana** (the Pacific) A 0510, S 1308, 1810; **NZ Forces Radio A/S** 1504; **Mana Korero** (Maori affairs) S 0606, 1605; **Country Life** F 0906; **Mana Tangata** M-F 1605.

**Info:** **Focus on Politics** A 0012; **Your Money** A 0106; **Eureka!** (science) A 0204; **Environment** [or] **Health Matters** A 0230; **Spiritual Outlook** A 1405, S 0512; **Bookmarks** S 0130; **Global Perspective** (documentaries) S 0206; **One in Five** (disability) S 0704; **Sounds Historical** S 0806; **Tradewinds** T 0830, 1330, 1530, W 0330; **What's Going On** (arts/cultural events) M-F 0430;

**Entertainment & Music:** **The Sampler** A 0033; **Comedy Zone** A 0130; **Home Grown** A 0306; **Music Mix** A 0607; **Saturday Night** A 0706; **Deep Purple** (relaxing music) A 1012; **New Music Releases** A 1308, S 1708, M 0330; **Hymns** A 1430; **At the Movies** S 0106; **Drama** S 0304, W 0906; **Music series** S 0406; **Jazz Spotlight** S 0540; **In a Mellow Tone** S 1405; **Storytime** M-F 0645; **Documentary series** T 0906; **Waiaata** (Maori music) H 0906; **Wayne's Music** M-F 0106, 1406.

**Sport:** **Sportsworld** S 1610; **World in Sport** W 0830, 1330, 1530, H 0330; **Sports Story** F 0830, 1330, 1530. **Live coverage** of rugby and cricket matches in season and as avail-

able, often between 0100-0700, preempting other programming.

**Media/DX:** **Mailbox/RNZI Talk** M 0830, 1330, 1530, T 0330; **Mediawatch** S 1012.

**inet:** Selected programs available on-demand; others on demand from rnz.co.nz

**wrn:** (15') M-F 1600 - **Korero Pacifica** (Pacific current affairs).

## POLAND

**R. Polonia** <http://www.radio.com.pl/polenia/>  
**inet:** live streaming and on-demand audio, with some archives.

**wrn:** (30') 1700 S **Insight** Central Europe, M-F News from Poland, A Europe East; 0300 S Europe East, M **Insight** Central Europe, T-A News from Poland.

## ROMANIA

**R. Romania Int.** <http://www.rri.ro>  
sw: (55') D 2300, 0100, 0400.

:00 D **Radio Newsreel**; :10 S **The Week**, M **Focus**, T-A **Commentary**; :15 S **World of Culture**, M **Sunday Studio**, T **Pro Memoria** (history), W **Business Club**, H **Society Today**, F **Cards on the Table** (debate), A **Challenge for the Future**; :20 S **RRI Encyclopedia**, T **Political Flash**, W **European Horizons**, A **Business Update**; :25 S **Roots** (culture/traditions), T **Business Update**, W **Visual Arts**, F **Listeners'Letterbox**, A **Practical Guide**; :30 S **Radio Pictures**, M **Romanian Itineraries**, H **Visit Romania**, A **Cultural Survey**; :35 S **Romanian Itineraries**, M **Listeners'Letterbox**, T **Pages of Romanian Literature**, W **Talking Points or Living Romania** [programs alternate], H **Partners in a Changing World**, F **Guest at the Microphone**, A **Over Coffee** (with artists); :40 S **Romanian** by Radio, M/F **The Skylark** (folk music), H **Stage and Screen**, A **Off Bucharest**; :45 S **DX Mailbag**, T **Romanian Hits**, H **Romanian Musicians**, A **Folk Music Box**; :50 M **Romanian Folk Music At Its Best**, T **Sports Roundup**, W **Athlete of the Week**, H **Sports Club**, F **Football Flash**, A **Sports Weekend**.

[All programs one day earlier UT during 2300 transmission.]

**inet:** all transmissions available via live audio stream and on-demand.

**wrn:** (30')—first ½ hr. of sw b/c above) D 1000, 1500, 2230.

## SERBIA & MONTENEGRO

**Int. R. of** <http://www.radioyu.org>

sw: (30') T-S 0100. Program mainly consists of news and comment about the situation in Serbia, Montenegro and the Balkans, especially the states that formerly were part of Yugoslavia.

**inet:** News in audio and text formats available on demand.

## SOUTH AFRICA

**Channel Africa** <http://www.channelafrica.org>

sw: No direct transmissions to NAM, but these broadcasts to wAF are often well heard in eNAM. (55') D 0500, 0700, 1700. Programs include news of Africa, the programs broadcast on wrn listed below and other features. (No definitive schedule available at press time.)

**inet:** Broadcasts and individual programs available via live stream and on-demand audio. (The web site is difficult to navigate and does not always operate well.)

**wrn:** M-F 0530, 1030, 1730 (30'): **Africa Rise and Shine** (news mag).

A 0530 (30'): **Tam Tam Express** (African gov't.)

## SPAIN

**R. Exterior de Espana** <http://www.rtve.es/rne/ree>

sw: (55') D 0000 - :00 S **American Chronicles**, M **Window on Spain** (culture), T-A **News** (international, Spain, Latin America); :14 S **Wines of Spain**, M **Spanish history or culture series**; :17 T-A **Spain Day-by-Day** (feature magazine); :24 S **Lab Notes and Field Notes**

(science); :34 S **Musical Interlude**, M **Radio Club** (letters), W **Entremeses** (food & tourism), F **American Chronicles**, A **Food in Spain**; :38 S/F **Cultural Roundup**, W **History Notes**, A **Africa Today**; :48 S **Radio Waves**, T-A **A Language Without Bounds** (Spanish lesson).

**inet:** mp3 downloads of selected programs available.

## THAILAND

**R. Thailand** <http://www.prd.go.th>  
sw: (30') D 0030, 0300 - **News**.  
**inet:** News available on demand.

## TURKEY

**V. of Turkey** <http://www.trt.net.tr>  
sw: (50') D 2200, 0300.

:00 D **News**; :10 D **Press Review**; :15 S **Outlook**, M **Basket of News**, T **Last Week**, W **Live From Turkey** [or] **A Stranger in Her Homeland**, H **Review of the Foreign Media**, F **The Balkans**, A **The European Union** [or] **The Magic of Nature**; :20 S **Once Upon a Time Traveler** [or] **DX Corner**, T **Hues & Colors of Anatolia**, H **Letterbox**; :25 M/A **Music**, F **In the Wake of a Contest**; :30 S/T **Music**; :35 S **Prehistoric Addresses in Turkey**, M **Yesterday, Today, Forever**, T **Sports in the Republican Era**, H **A Trip to Turkey**, F **The Culture Parade**, A **The Travel Itinerary of Anatolia**.

(Programs during 2200 transmission are one day earlier.)

**inet:** applicable to the Turkish service only.

## UKRAINE

**R. Ukraine Int.** <http://www.nrcu.gov.ua>  
sw: (55') D 0000, 0300.

:00 D **News**; :10 S **Ukrainian Diary** (weekly review), M **Music from Ukraine**, T-A **Ukraine Today** (magazine); :15 S **The Whole World on the Radio Dial** (DX program); :30 S **Hello From Kiev** (listener letters/music), M **Roots** (culture & education); :45 T-A **Closeup** (current issues).

**inet:** live audio stream of all broadcasts; news in text form with archive.

## VATICAN

**Vatican R.** <http://www.vaticanradio.org>  
sw: (20') D 0250 consisting of news, current events items and short features of special interest to Roman Catholics.

**inet:** live audio streams; also—news, features, inspirational messages, liturgies and prayer services available on demand.

**wrn:** (15') M-F 1615. **News**.

## VIETNAM

**V. of Vietnam** <http://www.vov.org.vn>  
sw: (30') D 0100, 0230.

:00 D **News**; :05 D **Current Affairs**; :10 S **Weekly Review**, M **Sunday Show**, T/W/F/A **Press Review**, H **Talk of the Week**; :15 T **Vietnam in Close Up**, W **Culture & Society**, H **Letterbox**, F **Vietnam Economy**, A **Rural Vietnam**; :20 S **Music**, A **Literature and Arts**.

**inet:** selected programs available on-demand with archive.

## WALES

**Wales R. Int.** <http://wri.cymru.net/>  
sw: (30') A 0200 **Celtic Notes** (magazine).

**inet:** Weekly program **Celtic Notes** available on demand, with archive.

**wrn:** A 1400, S 0030 (same as sw above).

## Daniel Sampson's PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

Your guide for up-to-date English shortwave schedules sorted by time, country and frequency plus a DX media program guide and newsletter

### A closer look at prepared QSL cards

Ask a seasoned DXer about prepared QSL cards, and some may likely wince. There was a time when such QSLing solutions were considered too easy. As the hobby changes, so do tactics for verifying, and this one has become a popular and successful technique.

As the name implies, a prepared card is one that you prepare and enclose with your reception report for the station to return to you. Blanks can be left on the card for the station to fill in times, frequency and date, or you can add that data so the station only has to sign or rubber stamp it. Your name and return address should be on the card with an "Airmail" notation.

So what's the use of preparing a card, when the station likely has its own, you ask? Most international broadcasters do indeed, but not so in many third world countries. You're likely to find stations in South America or Asia who either can't afford QSL cards or don't know what they are. With a brief explanation, most will return the card as verified.

Prepared cards may take many forms, such as ordinary postcard type stock, commercially printed cards or individually created cards. Picture postcards of the country to which you are writing can sometimes be obtained from the country's embassy or tourist bureau.

My method is to design a card using my PC's graphics pro-

gram and decorative fonts and colors. Try some web surfing to find the country's flag, map, national symbol or landmark to insert on the card. Save each image as a jpeg file to your hard drive, and you're on your way to designing a card that will be a station attention getter....just what you want!

Designing multilingual cards is just as easy. Cut and paste your text and use an on-line translation service such as <http://world.altavista.com/> or <http://www.freetranslation.com/>

Of course, return postage is a "must" in the use of mint stamps of the country. Postage may be purchased from: Bill Plum's Airmail Postage Service, 12 Glenn Road, Flemington, NJ 08822 USA. Include a self-addressed envelope for a current price list.

Now comes the question of affixing the stamps. Do you affix them on the card or do you enclose them within the letter? My preference is to enclose them. By doing so, the station has on occasion under separate cover, sent me pennants, letters or station souvenirs. Either method has been successful and I would recommend you experiment with both alternatives.

Still think it's *too easy*? The prepared card technique might be your solution ... so get creative!

#### ALBANIA

China Radio relay 5960 kHz. Full data *Happy New Year Rooster* card initialed and noted as Albanian relay, plus souvenir cut outs. Received in 46 days for an English report. Station address: 16A Shijingshan Street, Beijing 100040 China (or) P.O. Box 4216, CRI-2, Beijing 100040 China. Website: <http://www.cri.com.cn> English service <http://www.cirenglish.com> (Duane Hadley, Bristol, TN)

#### BRAZIL

Radio Record 6150 kHz. No data verification letter signed by Ivone Souza-Diretora Geral. Received in two months for CD report. Station address: Radio Record AM, Rua da Varzea 240, Barra Funda, Sao Paulo (SP), CEP 01140-080 Brazil. Website: <http://www.radiorecord.com.br> Email: [radio@rederecord.com.br](mailto:radio@rederecord.com.br) (Jerry Berg, Lexington, MA/DSWCI)

#### BULGARIA

Radio Bulgaria 5800 kHz. Partial data beach front view card, plus a nice piece of folk art. Received in 60 days for an English report. Station address: P.O. Box 900, BG-1000, Sofia, Bulgaria (or) 4 Dragan Tsankov Blvd., 1040 Sofia, Bulgaria. Website: <http://www.bnr.bg> (Joe Wood, Greenback, TN)



#### CLANDESTINE

Radio Minivan 11810 kHz. Full data verification signed by Monica Michie,

plus station info sheet. Received in 66 days for an English report. Station maildrop: 15, Fowler's Road, Salisbury, SPI 2QP England. Website (with Real Audio): <http://radiominivannews.com> Email: [minivanradio@gmail.com](mailto:minivanradio@gmail.com) (John Wilkins, Wheat Ridge, CO/Cumbre DX)

#### ECUADOR

HCJB 17640 kHz. Special QSL of HCJB Choir and Orchestra. Signed by Curt Cole-Vice President of International Ministries and Kazuo Ozaki-Director of Japanese Service. Schedule and station souvenirs enclosed with card. Received in 45 days for an English report of the December 24, 2004 special programming by the Japanese language service. Station address: Casilla 17-17-691, Quito, Ecuador. (Arnaldo Slaen, Buenos Aires, Argentina)

#### ERITREA

Voice of the Broad Masses 7100 kHz. Full data card and verification letter signed by Gerhane Gerezigiher-Technical Director of Radio Engineering. Received in 67 days for an English report and two IRCs. Station address: Ministry of Information, Radio Department, Radio Engineering Division, P.O. Box 243, Asmara, Eritrea. (Bruce W. Churchill, Fallbrook, CA/Cumbre DX)

#### MEDIUM WAVE

KZNX 1530 kHz AM. Verification letter and "goodie" pack of bumper stickers, business card, key chain, ESPN mug grabber plus a DVD Play Station 2 NCAA March Madness demo. My cassette returned with the SASE. The

tech noted the operation was on 15 watts the morning I heard them, and they dubbed my cassette tape to their hard drive! This is my 70<sup>th</sup> Texas station and medium wave QSL # 2,894. Station address: 4314 West Braker Lane # 1260, Austin, TX 78759. (Patrick Martin, Seaside, OR)

#### THAILAND

Bangkok Radio 6765.1 kHz USB. Full data card and verification letter signed by Ms. Jantima Niyomchok. Received in 45 days. Station address: Telecommunication Division, Meteorological Department, 4353 Sukhumvit Road 10260, Thailand. (Arnaldo Slaen, Buenos Aires, Argentina)

#### UNITED KINGDOM

VT Merlin Communications Limited 9800 kHz. Partial data *Leading the Way* verification card with site. Received in 30 days for a SASE (not used). QSL address: LTW, P.O. Box 20100, Atlanta, GA 30325. (Scott Barbour, Intervale, NH)

#### USA

AWR Full data QSL card signed by Adrian M. Peterson, for rebroadcast of Radio Monitors International Edition # 485 from September 1984 via Voice of the NASB via WRMI. Received in 285 days for email report to: [letters@awr.org](mailto:letters@awr.org). Received 1996 AWR Wavescan DX Contest certificate, five blank QSL cards, plus an assortment of vintage AWR souvenirs. (Kraig Krist KG4LAC, Annandale, VA) Goodie package received for special broadcast on 7385 kHz in 287 days. (Barbour, NH)



## HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa    USA, Voice of America    5995am    6130ca    7405am    9455af  
 ① ② ⑤    ③ ④    ⑥ ⑦

### Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

### Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes	
s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

### Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

### MT MONITORING TEAM

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### Thank You ...

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### Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

### Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

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## 0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0015	vi	Cambodia, National Radio	11940as	
0000	0015	vi	Croatia, Croatian Radio	7285as	
0000	0015		Japan, Radio	13650as	17810as
			17825na		
0000	0027		Czech Rep, Radio Prague Intl	9440na	
0000	0030		Egypt, Radio Cairo	7115na	
0000	0030		Thailand, Radio	9680va	13695va
0000	0030		UK, BBC World Service	3915as	5970as
			6195as 9410as	9740as	11945as 11955as
			15280as	15310as	15360as 17615as
			17790as		
0000	0030		USA, Voice of America	7215va	9890va
			11760va	11995as	15185va 15290va
			17740va		
0000	0045		India, All India Radio	9705as	9950as 11620as
			11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0000	0059		Spain, Radio Exterior Espana	6055na	
0000	0100		Anguilla, Caribbean Beacon	6090am	
0000	0100		Australia, ABC NT Alice Springs	2310irr	4835do
0000	0100		Australia, ABC NT Katherine	5025do	
0000	0100		Australia, ABC NT Tennant Creek	4910do	
0000	0100		Australia, Radio	9660as	12080as 13630pa
			15240pa	17715as	17750pa 17775pa
			17795as		
0000	0100		Australia, Voice Intl	7355as	
0000	0100		Bulgaria, Radio	7400na	9700na
0000	0100		Canada, CBC Northern Service	9625do	
0000	0100		Canada, CFRX Toronto ON	6070do	
0000	0100		Canada, CFVP Calgary AB	6030do	
0000	0100		Canada, CKZN St John's NF	6160do	
0000	0100		Canada, CKZU Vancouver BC	6160do	
0000	0100		China, China Radio Intl	6020al	6075as
			7170as 7180as	7345eu	9570as 11770as
0000	0100		Costa Rica, University Network	5030va	6150va
			7375va 9725va		
0000	0100		Germany, Deutsche Welle	7130as	9505as
			9825as		
0000	0100		Guyana, Voice of	3290do	
0000	0100		Malaysia, Radio	7295as	
0000	0100	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0000	0100		Netherlands, Radio	9845na	
0000	0100		New Zealand, Radio NZ Intl	15720pa	
0000	0100		Oman, Radio	5970as	
0000	0100		Sierra Leone, Radio UNAMSIL	6137do	
0000	0100		Singapore, Mediacorp Radio	6150do	
0000	0100	DRM	UK, BBC World Service	6010na	
0000	0100		UK, BBC World Service	5975ca	9525ca
			9825ca 12095ca		
0000	0100		Ukraine, Radio Ukraine Intl	7440na	
0000	0100		USA, AFRTS	4319usb	5765usb
			6350usb	7590usb	10320usb
			12133usb	12579usb	13362usb 13855usb
0000	0100		USA, KAJI Dallas TX	5755na	
0000	0100		USA, KTNB Salt Lake City UT	7505na	
0000	0100		USA, KWHR Naalehu HI	17510as	
0000	0100		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5810va	7425va
			11530va		
0000	0100		USA, WHRA Greenbush ME	7580na	
0000	0100		USA, WHRI Noblesville IN	7315am	7535am
0000	0100		USA, WINB Red Lion PA	9320am	
0000	0100		USA, WJIE Louisville KY	13595am	
0000	0100		USA, WRMI Miami FL 7385am	9955am	
0000	0100		USA, WRMI Miami FL 7385am	9955am	
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100		USA, WWCR Nashville TN	3210na	5070na
			7465na 13845na		
0000	0100		USA, WWRB Manchester TN	5050na	5085na
			5745na 6890na		
0000	0100		USA, WYFR Okeechobee FL	6065na	9505na
			11720as		
0000	0100		Zambia, Radio Christian Voice	4965af	
0005	0030	sm	Austria, Radio Austria Intl	7325as	
0015	0030	twfha	Austria, Radio Austria Intl	7325as	
0030	0045	s	Germany, Pan American BC	9740as	
0030	0100		Australia, Radio	9660as	12080as 13630pa
			15240pa	15415pa	17715as 17750pa
			17775as	17795as	
0030	0100	sm	Austria, Radio Austria Intl	7325am	
0030	0100		Germany, Bible Voice Broadcasting	6015as	
0030	0100		Lithuania, Radio Vilnius	9875na	
0030	0100		Lithuania, Radio Vilnius	9875na	
0030	0100		Sri Lanka, SLBC	6005as	15745as
0030	0100		Thailand, Radio	5890na	13595na
0030	0100		UK, BBC World Service	5970as	6195as
			9410as 9740as	11955as	15280as 15310as

0030	0100		15360as	17790as	
			USA, Voice of America		7215va 9890va
			15185va	15290va	17740va
0045	0100	twfha	Austria, Radio Austria Intl		7325am
0045	0100		Pakistan, Radio	9340as	11565as
0055	0100		Italy, RAI Intl	11800na	

## 0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0115		Italy, RAI Intl	11800na	
0100	0115		Pakistan, Radio	9340as	11565as
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na
0100	0128		Hungary, Radio Budapest	9590na	
0100	0128		Vietnam, Voice of	6175am	
0100	0129	s	Germany, Universal Life	9485as	
0100	0130		Australia, Radio	9660as	12080as 13630pa
			15240pa	15415pa	17715as 17750pa
			17775as	17795as	
0100	0130	twfhas	Serbia & Montenegro, Intl Radio	7115va	
0100	0130	vi	Slovakia, Slovak Radio	7230am	9440am
0100	0130		Uzbekistan, Radio Tashkent	5975as	6165as
			7160as		
0100	0156		Romania, Radio Romania Intl	6140na	9510na
			9615na 11740na		
0100	0157		China, China Radio Intl	6005na	7345na
			9580na		
0100	0157	DRM	Netherlands, Radio	15525na	
0100	0159		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0100	0200		Anguilla, Caribbean Beacon	6090am	
0100	0200		Australia, ABC NT Katherine	5025do	
0100	0200		Australia, ABC NT Tennant Creek	4910do	
0100	0200		Australia, HCJB	15560as	
0100	0200		Australia, Voice Intl	7355as	
0100	0200		Canada, CBC Northern Service	9625do	
0100	0200		Canada, CFRX Toronto ON	6070do	
0100	0200		Canada, CFVP Calgary AB	6030do	
0100	0200		Canada, CKZN St John's NF	6160do	
0100	0200		Canada, CKZU Vancouver BC	6160do	
0100	0200		Costa Rica, University Network	5030va	6150va
			7375va 9725va		
0100	0200		Cuba, Radio Havana	6000na	9820na
0100	0200		Guyana, Voice of	3291do	
0100	0200		Indonesia, Voice of	9525as	11785pa 15150al
0100	0200		Japan, Radio	5960va	11860as 11935sa
			15325as	17560va	17685pa 17810as
			17825ca	17845as	
0100	0200		Malaysia, Radio	7295as	
0100	0200	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0100	0200		Netherlands, Radio	9845na	
0100	0200		New Zealand, Radio NZ Intl	15720pa	
0100	0200		North Korea, Voice of	7140as	9345as
			9730am	11735am	13760as 15180as
0100	0200		Oman, Radio	11955as	
0100	0200		Sierra Leone, Radio UNAMSIL	6137do	
0100	0200		Singapore, Mediacorp Radio	6150do	
0100	0200		Sri Lanka, SLBC	6005as	11905as 15745as
0100	0200		UK, BBC World Service	5975ca	6195as
			9410as 9825ca	11955as	12095ca 15280as
			15310as	15360as	17790as
0100	0200		USA, AFRTS	4319usb	5765usb
			6350usb	7590usb	10320usb
			12133usb	12579usb	13362usb 13855usb
0100	0200		USA, KAJI Dallas TX	5755na	
0100	0200		USA, KTNB Salt Lake City UT	7505na	
0100	0200		USA, KWHR Naalehu HI	17510as	
0100	0200		USA, Voice of America	7200va	11705va
			11820va	17740va	
0100	0200		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0100	0200		USA, WBOH Newport NC	5920am	
0100	0200		USA, WEWN Birmingham AL	5810va	7425va
0100	0200		USA, WHRA Greenbush ME	7580na	
0100	0200	mtwhf	USA, WHRI Noblesville IN	5835am	
0100	0200	as	USA, WHRI Noblesville IN	7535am	
0100	0200		USA, WINB Red Lion PA	9320am	
0100	0200		USA, WJIE Louisville KY	13595am	
0100	0200		USA, WRMI Miami FL 7385am	9955am	
0100	0200		USA, WTJC Newport NC	9370na	
0100	0200		USA, WWCR Nashville TN	3210na	5070na
			5935na 7465na		
0100	0200		USA, WWRB Manchester TN	5050na	5085na
			5745na 6890na		
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na
			11720as		
0100	0200		Zambia, Radio Christian Voice	4965af	
0105	0115	vi	Croatia, Croatian Radio	7285as	
0130	0200		Australia, Radio	9660as	12080as 13630pa
			15240pa	15415pa	17715as 17750pa
			17795as		
0130	0200		Iran, Voice of the Islamic Rep	9495am	11875am
0130	0200		Sweden, Radio	6010na	9435va

# Shortwave Guide

MT

0130 0200 twhfa USA, Voice of America 7405va 9775va  
13740va  
0145 0158 twhfes Albania, Radio Tirana 6115eu 7160eu

## 0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0230		Austria, AWR Europe	9895as		
0200	0230	mtwfa	Belarus, Radio	5970eu	7210eu	
0200	0230		Iran, Voice of the Islamic Rep	9495am	11875am	
0200	0230		Serbia & Montenegro, Intl Radio	7130va		
0200	0257		China, China Radio Intl	13640as	11770as	
0200	0300		Anguilla, Caribbean Beacon	6090am		
0200	0300	twhfa	Argentina, RAE	11710na		
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835do	
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek	4910do		
0200	0300		Australia, HCJB	15560as		
0200	0300		Australia, Radio	9660as	12080as	13630pa
			15240pa	15415pa	15515as	17750pa
			21725pa			
0200	0300		Australia, Voice Intl	7355as		
0200	0300		Canada, CBC Northern Service		9625do	
0200	0300		Canada, CFRX Toronto ON		6070do	
0200	0300		Canada, CFVP Calgary AB		6030do	
0200	0300		Canada, CKZN St John's NF		6160do	
0200	0300		Canada, CKZU Vancouver BC		6160do	
0200	0300		Costa Rica, University Network		5030va	6150va
			7375va 9725va			
0200	0300		Cuba, Radio Havana	6000na	9820na	
0200	0300		Egypt, Radio Cairo	7260na		
0200	0300		Guyana, Voice of	3291do		
0200	0300		Malaysia, Radio	7295as		
0200	0300	vl	Namibia, Namibian BC Corp	6060do	3270do	3290do
			6175do			
0200	0300		New Zealand, Radio NZ Intl		15720pa	
0200	0300		North Korea, Voice of		4405as	13650as
			15100as			
0200	0300		Oman, Radio	11955as		
0200	0300		Philippines, Radio Pilipinas		12015as	15120pa
			15270as			
0200	0300		Russia, Voice of	7180na	7350na	15425na
			15475na	15595na	17695as	
0200	0300		Sierra Leone, Radio UNAMSIL		6137do	
0200	0300		Singapore, Mediacorp Radio		6150do	
0200	0300		South Korea, Radio Korea Intl		9560na	11810na
			15575na			
0200	0300		Sri Lanka, SLBC	6005as	11905as	15745as
0200	0300		Taiwan, Radio Taiwan Intl		5950na	9680na
			11875as	15465va		
0200	0300		UK, BBC World Service		5975ca	6195eu
			9410va 9825ca	9525ca	9750af	11760me
			11955as	12095ca	15280as	15310as
			15360as	17790as		
0200	0300		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0200	0300		USA, KAJI Dallas TX	5755na		
0200	0300		USA, KJES Vado NM	7555na		
0200	0300		USA, KTVN Salt Lake City UT		7505na	
0200	0300		USA, KWHR Naalehu HI		17510as	
0200	0300	mtwhf	USA, Voice of America		7200va	11705va
			11820va	17740va		
0200	0300		USA, WBCQ Kennebunk ME		5105na	7415na
			9330na			
0200	0300		USA, WBOH Newport NC		5920am	
0200	0300		USA, WEWN Birmingham AL		5810va	7425va
0200	0300		USA, WHRA Greenbush ME		5850na	
0200	0300	mtwhf	USA, WHRI Noblesville IN		5835am	
0200	0300	as	USA, WHRI Noblesville IN		7535am	17510am
0200	0300		USA, WINB Red Lion PA		9320am	
0200	0300		USA, WJIE Louisville KY		13595am	
0200	0300		USA, WRMI Miami FL 7385am		9955am	
0200	0300		USA, WTJC Newport NC		9370na	
0200	0300		USA, WWCR Nashville TN		3210na	5070na
			5935na 7465na			
0200	0300		USA, WWRB Manchester TN		5050na	5085na
			5745na 6890na			
0200	0300		USA, WYFR Okeechobee FL		5985na	6065na
			9505na 11855ca			
0200	0300		Zambia, Radio Christian Voice		4965af	
0205	0215	vl	Croatia, Croatian Radio		7285na	
0215	0230		Nepal, Radio		5005as	6100as
			7165as			
0230	0258	twhfas	Albania, Radio Tirana 6115eu		7160eu	
0230	0258		Hungary, Radio Budapest		9795na	
0230	0258		Vietnam, Voice of		6175am	
0230	0300	s	Belarus, Radio		5970eu	7210eu
0230	0300		Sweden, Radio		6010na	
0245	0300		Myanmar, Radio		9730do	
0250	0300		Vatican City, Vatican Radio		7305am	9605am

## 0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0327		Czech Rep, Radio Prague Intl		7345na	9870na
0300	0330	vl	Croatia, Croatian Radio		7285na	
0300	0330		Egypt, Radio Cairo		7260na	
0300	0330		Myanmar, Radio		9730do	
0300	0330		Philippines, Radio Pilipinas			15120as 15270pa
0300	0330	s	Swaziland, TWR		3200af	
0300	0330		Thailand, Radio		5890na	15460na
0300	0330		UK, BBC World Service			3255af 6005af
			6190af 7160af	9750af		12035af 11765af
0300	0330	a	UK, Wales Radio Intl		6005na	
0300	0330		USA, KJES Vado NM		7555na	
0300	0330		USA, Voice of America			6035af 6080af
			7290af 7340af	9885af		
0300	0330		Vatican City, Vatican Radio		7360af	
0300	0350		Turkey, Voice of		6140va	7270me
0300	0355		South Africa, Channel Africa			3345af 7390af
0300	0357		China, China Radio Intl		7190na	9690na
			9790na 11770as	15110as		
0300	0400		Anguilla, Caribbean Beacon		6090am	
0300	0400		Australia, ABC NT Alice Springs		2310irr	4835do
0300	0400		Australia, ABC NT Katherine		5025do	
0300	0400		Australia, ABC NT Tennant Creek		4910do	
0300	0400		Australia, Radio		9660as	12080as 13630pa
			15240pa	15415pa	15515as	17750pa
			21725pa			
0300	0400		Bulgaria, Radio		9400na	9700eu
0300	0400		Canada, CBC Northern Service			9625do
0300	0400		Canada, CFRX Toronto ON			6070do
0300	0400		Canada, CFVP Calgary AB			6030do
0300	0400		Canada, CKZN St John's NF			6160do
0300	0400		Canada, CKZU Vancouver BC			6160do
0300	0400		Costa Rica, University Network			5030va 6150va
			7375va 9725va			
0300	0400		Cuba, Radio Havana		6000na	9820na
0300	0400	vl	Guatemala, Radio Cultural			3300as
0300	0400		Guyana, Voice of		3291do	
0300	0400		Japan, Radio		21610pa	
0300	0400		Malaysia, Radio		7295as	
0300	0400		Malaysia, Voice of		6175as	9750as 15295as
0300	0400	vl	Namibia, Namibian BC Corp		6060do	3270do 3290do
			6175do			
0300	0400		New Zealand, Radio NZ Intl			15720pa
0300	0400		North Korea, Voice of			3560as 7140as
			9345as 9730as			
0300	0400		Oman, Radio		15575as	
0300	0400		Russia, Voice of		7150na	7180na 7350na
			12010na	15425na	15475na	15595na
			17695as			
0300	0400	vl	Rwanda, Radio		6055do	
0300	0400		Sierra Leone, Radio UNAMSIL			6137do
0300	0400		Singapore, Mediacorp Radio			6150do
0300	0400		Sri Lanka, SLBC		6005as	11905as 15745as
0300	0400		Taiwan, Radio Taiwan Intl			5950va 15125va
			15320va			
0300	0400	vl	Uganda, Radio		4976do	5026do 7196do
0300	0400		UK, BBC World Service			5975ca 9410va
			9525ca 11760me	12095eu	15310as	15280as
			15360as	15575me	17760as	17790as
			21660as			
0300	0400	vl/ mtwhf	UK, Sudan Radio Service			9625va
0300	0400		Ukraine, Radio Ukraine Intl			7440na
0300	0400		USA, AFRTS		4319usb	5446usb 5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0300	0400		USA, KAJI Dallas TX		5755na	
0300	0400		USA, KTVN Salt Lake City UT			7505na
0300	0400		USA, KWHR Naalehu HI			17510as
0300	0400		USA, Voice of America			4930af 4960af
0300	0400		USA, WBCQ Kennebunk ME			5105na 7415na
			9330na			
0300	0400		USA, WBOH Newport NC			5920am
0300	0400		USA, WEWN Birmingham AL			5810va 7425va
0300	0400		USA, WHRA Greenbush ME			5850na
0300	0400	mtwhf	USA, WHRI Noblesville IN			5835am
0300	0400	as	USA, WHRI Noblesville IN			7535am 17510am
0300	0400		USA, WINB Red Lion PA			9320am
0300	0400		USA, WJIE Louisville KY			13595am
0300	0400		USA, WRMI Miami FL 7385am			9955am
0300	0400		USA, WTJC Newport NC			9370na
0300	0400		USA, WWCR Nashville TN			3210na 5070na
			5935na 7465na			
0300	0400		USA, WWRB Manchester TN			5050na 5085na
			5745na 6890na			
0300	0400		USA, WYFR Okeechobee FL			6065na 9505na
			9985na 11740na			
0300	0400		Zambia, Radio Christian Voice			4965af
0300	0400	vl	Zimbabwe, ZBC Corp		5975do	
0330	0345		Hungary, Radio Budapest			6025eu 9655eu
0330	0357		Czech Rep, Radio Prague Intl			9445va 11600va
0330	0358		Vietnam, Voice of		6175am	
0330	0400		UAE, Emirates Radio		12005na	13675na 15400na

# Shortwave Guide



0330	0400	UK, BBC World Service 6190af 7160af 9750af 15420af	3255af 12035af	6005af 11765af
0330	0400	USA, Voice of America 7290af 9885af	6035af	6080af

## 0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0430	Australia, Radio 15240pa	9660as 15515pa	12080as 17750pa	13630pa 21725pa
0400	0430	France, Radio France Intl		9555af	9805af
0400	0430	Sri Lanka, SLBC	6005as	11905as	15745as
0400	0430	USA, Voice of America 9575af 9775af 9885af		6080af	7290af
0400	0456	Romania, Radio Romania Intl 11870va	6125va 15250va		9515va
0400	0457	China, China Radio Intl 9755na		6190na	9560na
0400	0457	DRM Netherlands, Radio	15400au		
0400	0458	New Zealand, Radio NZ Intl		15720pa	
0400	0500	Anguilla, Caribbean Beacon		6090am	
0400	0500	Australia, ABC NT Alice Springs		2310irr	4835do
0400	0500	Australia, ABC NT Katherine		5025do	
0400	0500	Australia, ABC NT Tennant Creek		4910do	
0400	0500	Canada, CBC Northern Service		9625do	
0400	0500	Canada, CFRX Toronto ON		6070do	
0400	0500	Canada, CKZN St John's NF		6160do	
0400	0500	Canada, CKZU Vancouver BC		6160do	
0400	0500	Costa Rica, University Network 7375va 9725va		5030va	6150va
0400	0500	Cuba, Radio Havana	6000na	9820na	
0400	0500	Germany, Deutsche Welle 15445as		7170af	11945as
0400	0500	Guyana, Voice of	3291do		
0400	0500	Malaysia, Radio	7295as		
0400	0500	Malaysia, Voice of	6175as	9750as	15295as
0400	0500	vi Namibia, Namibian BC Corp 6060do	6175do	3270do	3290do
0400	0500	Netherlands, Radio	6165na	9590na	
0400	0500	Nigeria, Radio/Kaduna		6090do	
0400	0500	Oman, Radio	15575as		
0400	0500	Russia, Voice of	7150na	7180na	7350na
0400	0500	12010na	15595na	15595na	17695as
0400	0500	vi Rwanda, Radio	6055do		
0400	0500	Sierra Leone, Radio UNAMSIL		6137do	
0400	0500	Singapore, Mediacorp Radio		6150do	
0400	0500	South Africa, Channel Africa		3345af	
0400	0500	vi Uganda, Radio	4976do	5026do	7196do
0400	0500	UK, BBC World Service		6010na	
0400	0500	UK, BBC World Service		3255af	5975ca
0400	0500	6005af 6135ca	6190af	6195eu	9410va
0400	0500	11760me	11765af	12035af	15310as
0400	0500	15280os	15360as	15420af	15575me
0400	0500	17760as	17790as	21660as	
0400	0500	vi/ mtwhf UK, Sudan Radio Service		9625va	
0400	0500	USA, AFRTS	4319usb	5446usb	5765usb
0400	0500	6350usb	7590usb	7812usb	10320usb
0400	0500	12133usb	12579usb	13362usb	13855usb
0400	0500	USA, KALJ Dallas TX	5755na		
0400	0500	USA, KTBN Salt Lake City UT		7505na	
0400	0500	USA, KWHR Naalehu HI		17780as	
0400	0500	USA, Voice of America		4930af	4960af
0400	0500	USA, WBCQ Kennebunk ME		5105na	7415na
0400	0500	9330na			
0400	0500	USA, WBOH Newport NC		5920am	
0400	0500	USA, WEWN Birmingham AL		5810va	7425va
0400	0500	USA, WMLK Greenbush ME		5850na	
0400	0500	USA, WHRI Noblesville IN		5835am	
0400	0500	USA, WHRI Noblesville IN		7535am	17220am
0400	0500	USA, WINB Red Lion PA		9320am	
0400	0500	USA, WJIE Louisville KY		13595am	
0400	0500	USA, WMLK Bethel PA		9265eu	9955eu
0400	0500	USA, WRMI Miami FL 7385am		9955am	
0400	0500	USA, WTJC Newport NC		9370na	
0400	0500	USA, WWCR Nashville TN		3210na	5070na
0400	0500	5770na 5935na			
0400	0500	USA, WWRB Manchester TN		5050na	5085na
0400	0500	5745na 6890na			
0400	0500	USA, WYFR Okeechobee FL		6065va	6855va
0400	0500	7355va 9505va 9715va			
0400	0500	USA, WYFR Okeechobee FL		6855va	7355va
0400	0500	Zambia, Radio Christian Voice		6065af	
0400	0500	vi Zimbabwe, ZBC Corp 5975do			
0405	0415	vi Croatia, Croatian Radio		7285na	9480au
0430	0445	Israel, Kol Israel	7545va	9345va	11605va
0430	0445	Uzbekistan, Radio Tashkent		5025eu	7185eu
0430	0500	11905eu			
0430	0500	Australia, Radio	9660as	12080as	13630pa
		15240pa	15415pa	15515va	17750pa
		21725pa			

0430	0500	Nigeria, Radio/Ibadan		6050do	
0430	0500	Nigeria, Radio/Kaduna		4770do	
0430	0500	Nigeria, Radio/Lagos	3326do	4990do	
0430	0500	mtwhf Swaziland, TWR	4775af	6120af	
0430	0500	USA, Voice of America 9575af 9775af		6080af	7290af
0445	0500	Italy, RAI Intl	6110af	7235af	9800af
0459	0500	New Zealand, Radio NZ Intl		11820pa	

## 0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0530	Australia, Radio	9660as	12080as	13630pa
		15160pa	15240pa	15515va	17750pa
0500	0530	France, Radio France Intl		11850af	11995af
0500	0530	vi Rwanda, Radio	6055do		
0500	0530	UK, BBC World Service		6005af	6190af
		7160af 11765af	11940af	11955as	15280as
		15310as	15360as	15420af	17640af
		17760as	17790as	17885af	21660as
0500	0530	Vatican City, Vatican Radio		7360af	9660af
		11625af			
0500	0555	South Africa, Channel Africa		7240af	11875af
0500	0557	China, China Radio Intl		6190as	9560na
		11750as	11770as	11880as	15350as
		15465as	17505al	17540as	
0500	0600	Anguilla, Caribbean Beacon		6090am	
0500	0600	Australia, ABC NT Alice Springs		2310irr	4835do
0500	0600	Australia, ABC NT Katherine		5025do	
0500	0600	Australia, ABC NT Tennant Creek		4910do	
0500	0600	Canada, CBC Northern Service		9625do	
0500	0600	Canada, CFRX Toronto ON		6070do	
0500	0600	Canada, CKZN St John's NF		6160do	
0500	0600	Canada, CKZU Vancouver BC		6160do	
0500	0600	Costa Rica, University Network 7375va 9725va		5030va	6150va
0500	0600	Cuba, Radio Havana	6000na	6060na	9550na
		11760am			
0500	0600	Germany, Deutsche Welle		9630af	9700af
		15410af	17800af		
0500	0600	vi Greece, Voice of	5865eu	7475eu	9420eu
0500	0600	Guyana, Voice of	3291do		
0500	0600	Japan, Radio	5975eu	6110na	7230eu
		15195as	17810as	21755pa	
0500	0600	Malaysia, Radio	7295as		
0500	0600	Malaysia, Voice of	6175as	9750as	15295as
0500	0600	vi Namibia, Namibian BC Corp 6060do	6175do	3270do	3290do
0500	0600	New Zealand, Radio NZ Intl		11820pa	
0500	0600	Nigeria, Radio/Ibadan		6050do	
0500	0600	Nigeria, Radio/Kaduna		4770do	6090do
0500	0600	Nigeria, Radio/Lagos	3326do	4990do	
0500	0600	Nigeria, Voice of	15120af		
0500	0600	Oman, Radio	15310as		
0500	0600	Russia, Voice of	7150na	7180na	7350na
		12010na	15595na	15595na	17696as
0500	0600	Sierra Leone, Radio UNAMSIL		6137do	
0500	0600	Singapore, Mediacorp Radio		6150do	
0500	0600	mtwhf Swaziland, TWR	6120af		
0500	0600	as Swaziland, TWR	4775af		
0500	0600	Swaziland, TWR	9500af		
0500	0600	vi Uganda, Radio	4976do	5026do	7196do
0500	0600	UK, BBC World Service		6135ca	6195eu
		9410eu 11760me	15565eu	15575me	
0500	0600	UK, Sudan Radio Service		11795va	
0500	0600	USA, AFRTS	4319usb	5446usb	5765usb
		6350usb	7590usb	7812usb	10320usb
		12133usb	12579usb	13362usb	13855usb
0500	0600	USA, KALJ Dallas TX	5755na		
0500	0600	USA, KTBN Salt Lake City UT		7505na	
0500	0600	USA, KWHR Naalehu HI		11565as	17780as
0500	0600	USA, Voice of America		4930af	4960af
		6035af 6105af	7295af	13710af	
0500	0600	USA, WBCQ Kennebunk ME		5105na	7415na
		9330na			
0500	0600	USA, WBOH Newport NC		5920am	
0500	0600	USA, WEWN Birmingham AL		5745va	7425va
		7570va 11615va			
0500	0600	USA, WHRA Greenbush ME		5875na	
0500	0600	USA, WHRI Noblesville IN		5970am	
0500	0600	USA, WHRI Noblesville IN		7535am	15220am
0500	0600	USA, WJIE Louisville KY		13595am	
0500	0600	USA, WMLK Bethel PA		9265eu	9955eu
0500	0600	USA, WRMI Miami FL 7385am		9955am	
0500	0600	USA, WTJC Newport NC		9370na	
0500	0600	USA, WWCR Nashville TN		3210na	5070na
		5770na 5935na			
0500	0600	USA, WWRB Manchester TN		5050na	5085na
		6890na			
0500	0600	USA, WYFR Okeechobee FL		6855va	7520na
0500	0600	Zambia, Radio Christian Voice		6065af	
0500	0600	vi Zimbabwe, ZBC Corp 5975do			
0505	0515	vi Croatia, Croatian Radio		7285na	9470au

# Shortwave Guide



0525	0600	vi	12105au	12110au		
0530	0600		Ghana, Ghana BC Corp	3366do	4915do	
			Australia, Radio	9660as	11750as	12080as
			13630pa	15160va	15240as	15415pa
			15515as	17750as		
0530	0600		Thailand, Radio	13780eu		
0530	0600		UAE, Emirates Radio	15435va	17830va	21700va
0530	0600		UK, BBC World Service	6005af	6190af	
			7160af 9410af	11765af	11940af	11955as
			15310as	15360as	15420af	17640af
			17760as	17790as	21660as	
0530	0600	mtwhf	UK, BBC World Service			
0545	0600	vi	Rwanda, Radio	6055do	17885af	

## 0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0605	as	South Africa, TWR	11640af		
0600	0620		Vatican City, Vatican Radio	7250eu	4005eu	5890eu
0600	0630		France, Radio France Intl	15155af	9595af	11665af
0600	0630		UK, BBC World Service	6005af	7160af	
			9410af 11765af	11940af	12095af	17640af
0600	0630		USA, Voice of America	4930af	4930af	4960af
			6105af 7295af	9695af	11835af	13710af
0600	0630	mtwhf	USA, Voice of America		11995af	
0600	0635	mtwhf	South Africa, TWR	11640af		
0600	0657		China, China Radio Intl	6115na	7385al	
			11770na	11880as	15140as	15350as
			15465as			
0600	0700		Anguilla, Caribbean Beacon	6090am		
0600	0700		Australia, ABC NT Alice Springs	2310irr	4835do	
0600	0700		Australia, ABC NT Katherine	5025do		
0600	0700		Australia, ABC NT Tennant Creek	4910do		
0600	0700		Australia, Radio	9660as	11880as	12080as
			13630pa	15160va	15240as	15415pa
			15515va	17750as		
0600	0700		Canada, CFRX Toronto ON	6070do		
0600	0700		Canada, CFVP Calgary AB	6030do		
0600	0700		Canada, CKZN St John's NF	6160do		
0600	0700		Canada, CKZU Vancouver BC	6160do		
0600	0700		Costa Rica, University Network	5030va	6150va	
			7375va 9725va	11870va		
0600	0700		Cuba, Radio Havana	6000na	6060na	9550na
			11760am			
0600	0700		Germany, Deutsche Welle	6140eu	7170af	
			15275af	17860af		
0600	0700	DRM	Germany, Deutsche Welle	21675eu		
0600	0700	vi	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700		Greece, Voice of	5865eu	9420eu	15630eu
0600	0700		Guyana, Voice of	3291do		
0600	0700		Japan, Radio	7230eu	11715as	11740as
			11760as	13630va	15195as	17870pa
			21755pa			
0600	0700		Liberia, ELWA	4760do		
0600	0700		Malaysia, Radio	7295as		
0600	0700		Malaysia, Voice of	6175as	9750as	15295as
0600	0700	vi	Namibia, Namibian BC Corp	6060do	6175do	
0600	0700		New Zealand, Radio NZ Intl	11820pa		
0600	0700		Nigeria, Radio/Ibadan	6050do		
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	
0600	0700		Nigeria, Radio/Lagos	3326do	4990do	
0600	0700		Nigeria, Voice of	15120af		
0600	0700		Russia, Voice of	17665pa	21790pa	
0600	0700		Sierra Leone, Radio UNAMSIL	6137do		
0600	0700	irreg/ vi	Sierra Leone, SLBS	3316do		
0600	0700		Singapore, Mediagroup Radio	6150do		
0600	0700	vi	Solomon Islands, SIBC	5020do	9545do	
0600	0700		South Africa, Channel Africa	7240af	15220af	
0600	0700	as	Swaziland, TWR	4775af		
0600	0700		Swaziland, TWR	6120af	9500af	
0600	0700		UK, BBC World Service	6195eu	9410eu	
			11955as	12095eu	15310as	15360as
			15565eu	15575me	17760as	17790as
			21660as			
0600	0700	as	UK, BBC World Service	17885af		
0600	0700		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0600	0700		USA, KAIJ Dallas TX	5755na		
0600	0700		USA, KTNB Salt Lake City UT	7505na		
0600	0700		USA, KWHR Naalehu HI	9930as	11565as	
0600	0700		USA, WBQC Kennebunk ME	5105na	7415na	
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Birmingham AL	5745va	7425va	
			7570va 11615va			
0600	0700		USA, WHRA Greenbush ME	7580na		
0600	0700		USA, WHRI Noblesville IN	7315am	7535am	
			9930am	11565am		
0600	0700		USA, WJIE Louisville KY	13595am		
0600	0700		USA, WMLK Bethel PA	9265eu	9955eu	

0600	0700		USA, WRMI Miami FL	7385am	9955am	
0600	0700		USA, WTJC Newport NC		9370na	
0600	0700		USA, WWCR Nashville TN		3210na	5070na
			5770na 5935na			
0600	0700		USA, WYFR Okeechobee FL		5850eu	7355eu
			9680eu 11530na	11580va		
0600	0700	vi	Vanuatu, Radio	4960do		
0600	0700		Yemen, Rep of Yemen Radio		9780me	
0600	0700	vi	Zimbabwe, ZBC Corp	5975do		
0605	0615	vi	Croatia, Croatian Radio		9480au	12105au
			12110au			
0605	0630	as	Austria, Radio Austria Intl		17870me	
0630	0656		Romania, Radio Romania Intl		9565eu	11710eu
0630	0700	vi	Georgia, Radio Georgia		11805eu	
0630	0700	s	Germany, Bible Voice Broadcasting		5945eu	
0630	0700		UK, BBC World Service		6005af	6190af
			7160af 9410af	11765af	11940af	12095af
			15400af	17640af		
0630	0700		USA, Voice of America		6080af	7295af
			11835af			
0630	0700		Vatican City, Vatican Radio		9660af	11625af
			13765af			
0635	0700	as	Austria, Radio Austria Intl		17870me	
0645	0700	s	Albania, TWR		11865eu	
0645	0700	mtwhf	Austria, Radio Austria Intl		17870me	
0645	0700	s	Monaco, TWR		9870eu	

## 0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0705		New Zealand, Radio NZ Intl	11820pa		
0700	0715	vi	Croatia, Croatian Radio	9470au	12105au	
			12110au	13820eu		
0700	0715		UK, BBC World Service	6005af	6190af	
			11940af	11765af	12095af	15400af
			17830af			
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu	
0700	0730	vi	Slovakia, Slovak Radio	13715au	15460au	
0700	0730		UK, BBC World Service	11760me	15575me	
0700	0800	mtwhf	Albania, TWR	11865eu		
0700	0800		Anguilla, Caribbean Beacon	6090am		
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do	
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek	4910do		
0700	0800		Australia, HCJB	11750au		
0700	0800		Australia, Radio	9660as	11880as	12080as
			13630pa	15160va	15240as	15415pa
			17750pa			
0700	0800		Canada, CFRX Toronto ON	6070do		
0700	0800		Canada, CFVP Calgary AB	6030do		
0700	0800		Canada, CKZN St John's NF	6160do		
0700	0800		Canada, CKZU Vancouver BC	6160do		
0700	0800		China, China Radio Intl	11855as	11880as	
			15350as	15465as	17540as	17490al
0700	0800		Costa Rica, University Network	5030va	6150va	
			7375va 9725va	11870va		
0700	0800		Eqt Guinea, Radio Africa	15190af		
0700	0800		France, Radio France Intl	11700af	11725af	
0700	0800	as	Germany, Bible Voice Broadcasting	5945eu		
0700	0800		Germany, Deutsche Welle	6140eu		
0700	0800	DRM	Germany, Deutsche Welle	21675eu		
0700	0800	vi	Ghana, Ghana BC Corp	3366do	4915do	
0700	0800		Greece, Voice of	9420eu	11645eu	15630eu
0700	0800		Guyana, Voice of	3291do	5950do	
0700	0800		Liberia, ELWA	4760do		
0700	0800		Malaysia, Radio	7295as		
0700	0800		Malaysia, Voice of	6175as	9750as	15295as
0700	0800	mtwhfa	Monaco, TWR	9870eu		
0700	0800		Myanmar, Radio	9730do		
0700	0800	vi	Namibia, Namibian BC Corp	6060do	6175do	
0700	0800		Nigeria, Radio/Ibadan	6050do		
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	
0700	0800		Nigeria, Radio/Lagos	3326do	4990do	
0700	0800		Russia, Voice of	12005pa	12060pa	17665pa
			21790pa			
0700	0800	DRM	Russia, Voice of	15780eu		
0700	0800		Sierra Leone, Radio UNAMSIL	6137do		
0700	0800	irreg/ vi	Sierra Leone, SLBS	3316do		
0700	0800		Singapore, Mediagroup Radio	6150do		
0700	0800	vi	Solomon Islands, SIBC	5020do	9545do	
0700	0800		South Africa, Channel Africa	11825af		
0700	0800		Swaziland, TWR	6120af		
0700	0800		Swaziland, TWR	9500af		
0700	0800		Taiwan, Radio Taiwan Intl	5950na		
0700	0800		UK, BBC World Service	9410eu	11955as	
			12095eu	15310as	15360as	15485va
			15565eu	17760as	17790as	21660as
0700	0800	as	UK, BBC World Service	17885af		
0700	0800		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0700	0800		USA, KAIJ Dallas TX	5755na		

# Shortwave Guide



0700	0800		USA, KTNB Salt Lake City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	9930as	11565as
0700	0800		USA, Voice of America	5995af	9700af
			11655af		
0700	0800		USA, WBCQ Kennebunk ME	5105na	7415na
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5745va	7475va
			7570va 11615va		
0700	0800		USA, WHRA Greenbush ME	7580na	
0700	0800		USA, WHRI Noblesville IN	7315am	7535am
			9930am 11565am		
0700	0800		USA, WJIE Louisville KY	13595am	
0700	0800		USA, WMLK Bethel PA	9265eu	9955eu
0700	0800		USA, WRMI Miami FL 7385am	9955am	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3210na	5070na
			5770na 5935na		
0700	0800		USA, WYFR Okeechobee FL	6855va	5985va
			9495va 9715va 9985va		
0700	0800	vl	Vanuatu, Radio	4960do	
0706	0800		New Zealand, Radio NZ Intl	9885pa	
0715	0750	a	Albania, TWR	11865eu	
0715	0750	a	Monaco, TWR	9870eu	
0715	0800	f	Germany, Bible Voice Broadcasting	5945eu	
0715	0800		UK, BBC World Service	6190af	11765af
			11940af 12095af	15400af	17830af
				13600eu	
0730	0800		Bulgaria, Radio	11805eu	
0730	0800		Georgia, Radio Georgia		
0730	0800	as	Guam, TWR/KTWR	15255as	
0740	0800	mtwhf	Guam, TWR/KTWR	15225as	

## 0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0815	a	Germany, Bible Voice Broadcasting	5945eu	
0800	0820	mtwhfs	Albania, TWR	11865eu	
0800	0820	s	Monaco, TWR	9870eu	
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek	4910do	
0800	0830		Australia, Radio	5995as	9590as
			9710as 12080pa	13630pa	15240pa
0800	0830		Liberia, ELWA	4760do	
0800	0830	vl	Malaysia, Voice of	6175as	9750as
0800	0830		Myanmar, Radio	9730do	
0800	0845	s	Germany, Bible Voice Broadcasting	5945eu	
0800	0857		China, China Radio Intl	11855al	11880as
			15350as 15465as	17540as	17490al
0800	0900		Anguilla, Caribbean Beacon	6090am	
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do
0800	0900		Australia, HCJB	11750au	
0800	0900		Canada, CFRX Toronto ON	6070do	
0800	0900		Canada, CFVP Calgary AB	6030do	
0800	0900		Canada, CKZN St John's NF	6160do	
0800	0900		Canada, CKZU Vancouver BC	6160do	
0800	0900		Costa Rica, University Network	5030va	6150va
			7375va 9725va	11870va	
0800	0900		Eat Guinea, Radio Africa	15190af	
0800	0900		Germany, Deutsche Welle	6140eu	
0800	0900	DRM	Germany, Deutsche Welle	21675eu	
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do
0800	0900	vl	Greece, Voice of	9420eu	11645eu
0800	0900	mtwhf	Guam, TWR/KTWR	11840as	15225as
0800	0900		Guyana, Voice of	3291do	5950do
0800	0900		Indonesia, Voice of	9525as	11785pa
0800	0900	vl/as	Italy, IRRS 13840eu		15150al
0800	0900		Malaysia, Radio	7295as	
0800	0900		Malaysia, Voice of	15295as	
0800	0900		New Zealand, Radio NZ Intl	9885pa	
0800	0900		Nigeria, Radio/Ibadan	6050do	
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do
0800	0900		Nigeria, Radio/Lagos	3326do	4990do
0800	0900	vl	Pakistan, Radio	15100eu	17835eu
0800	0900		Papua New Guinea, Catholic Radio		4960do
0800	0900		Papua New Guinea, NBC	4890do	
0800	0900	DRM	Russia, Voice of	15780eu	
0800	0900		Russia, Voice of	12005pa	12060pa
			17525pa	17570pa	17495pa
					21790pa
0800	0900		Sierra Leone, Radio UNAMSIL	6137do	
0800	0900	irreg/ vl	Sierra Leone, SLBS	3316do	
0800	0900		Singapore, Mediacorp Radio	6150do	
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do
0800	0900	s	South Africa, SW Radio League	9750af	17700af
0800	0900		South Korea, Radio Korea Intl	9570as	9640eu
0800	0900	as	Swaziland, TWR	6120af	
0800	0900		Swaziland, TWR	9500af	
0800	0900		Taiwan, Radio Taiwan Intl	9610au	
0800	0900		UK, BBC World Service	6190af	9410eu
			11760me	11955as	12095eu
			15310as	15360as	15400af
			15565eu	17760as	15485va
			17885af	21470af	21660as
0800	0900	as	UK, BBC World Service	17640me	
0800	0900		USA, AFRTS	4319usb	5765usb

			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0800	0900		USA, KAUJ Dallas TX	5755na		
0800	0900		USA, KNLS Anchor Point AK		11765as	
0800	0900		USA, KTNB Salt Lake City UT		7505na	
0800	0900		USA, KWHR Naalehu HI		11565as	17780as
0800	0900		USA, Voice of America	5995af	9700af	
			11655af			
0800	0900		USA, WBCQ Kennebunk ME	5105na	7415na	
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Birmingham AL	5745na	7425na	
			11875na			
0800	0900		USA, WHRI Noblesville IN	5860am	7315am	
			9930am 11565am			
0800	0900		USA, WJIE Louisville KY	13595am		
0800	0900		USA, WMLK Bethel PA	9265eu	9955eu	
0800	0900		USA, WRMI Miami FL 7385am	9955am		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3210na	5070na	
			5770na 5935na			
0800	0900		USA, WYFR Okeechobee FL	5950af	6855af	
			7455af 9985af			
0800	0900	vl	Vanuatu, Radio	4960do		
0805	0815	vl	Croatia, Croatian Radio		12105au	12110au
0815	0900	as	Guam, TWR/KTWR	11840as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Australia, Radio	5995as	9580as	9590as
			9710as 12080pa	13630pa	15240pa	15415pa
			17750pa			
0830	0900		Georgia, Radio Georgia	11910eu		

## 0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do
0900	0929		Czech Rep, Radio Prague Intl	21745va	
0900	0930		Australia, Radio	9580as	9590as
			15240pa		
0900	0930		Guam, TWR/KTWR	11840as	
0900	0930		UK, BBC World Service	6195as	9605as
			9740as 15310as	15360as	17760as
			21660as		
0900	0957		China, China Radio Intl	15210pa	17490eu
			17690pa		
0900	1000		Anguilla, Caribbean Beacon	6090am	
0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr
0900	1000		Australia, ABC NT Katherine	2485do	
0900	1000		Australia, ABC NT Tennant Creek	2325do	
0900	1000		Australia, HCJB	11750au	
0900	1000		Australia, Voice Intl	11955as	13685as
0900	1000		Canada, CFRX Toronto ON	6070do	
0900	1000		Canada, CFVP Calgary AB	6030do	
0900	1000		Canada, CKZN St John's NF	6160do	
0900	1000		Canada, CKZU Vancouver BC	6160do	
0900	1000		Costa Rica, University Network	5030va	6150va
			7375va 9725va	11870va	
0900	1000		Eat Guinea, Radio Africa	13750va	
0900	1000		Germany, Deutsche Welle	15190af	
0900	1000	DRM	Germany, Deutsche Welle	6140eu	
0900	1000	vl	Greece, Voice of	21675eu	
			9375eu	9420eu	11645eu
			15630eu		
0900	1000	vl/as	Guyana, Voice of	3291do	5950do
0900	1000		Italy, IRRS 13840eu		
0900	1000		Malaysia, Radio	7295as	
0900	1000		Malaysia, Voice of	15295as	
0900	1000	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0900	1000		New Zealand, Radio NZ Intl	9885pa	
0900	1000		Nigeria, Radio/Ibadan	6050do	
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do
0900	1000		Nigeria, Radio/Lagos	3326do	4990do
0900	1000	vl	Pakistan, Radio	15100eu	17835eu
0900	1000		Papua New Guinea, Catholic Radio		4960do
0900	1000		Papua New Guinea, NBC	4890do	
0900	1000	DRM	Russia, Voice of	15780eu	
0900	1000		Russia, Voice of	17495pa	17525pa
			17665pa		17570va
0900	1000	vl	Rwanda, Radio	6055do	
0900	1000		Sierra Leone, Radio UNAMSIL	6137do	
0900	1000	irreg/ vl	Sierra Leone, SLBS	3316do	
0900	1000		Singapore, Mediacorp Radio	6150do	
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do
0900	1000		UK, BBC World Service	6190af	11760me
			11940af	15190ca	15400af
			15565eu	15575me	17640me
			21470af		17885af
0900	1000		USA, AFRTS	4319usb	5446usb
0900	1000		USA, KAUJ Dallas TX	5755na	5765usb
0900	1000		USA, KTNB Salt Lake City UT	7505na	7812usb
0900	1000		USA, KWHR Naalehu HI	11565as	10320usb
					13855usb

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0900	1000	USA, Voice of America	15615me	17555me
0900	1000	USA, WBCQ Kennebunk ME	5105na	7415na
0900	1000	USA, WBOH Newport NC	5920am	
0900	1000	USA, WEWN Birmingham AL	5745na	7425na
		11875na		
0900	1000	USA, WHRI Noblesville IN	5860am	7315am
		9930am	11565am	
0900	1000	USA, WJIE Louisville KY	13595am	
0900	1000	USA, WRMI Miami FL 7385am	9955am	
0900	1000	USA, WTJC Newport NC	9370na	
0900	1000	USA, WWCR Nashville TN	3210na	5070na
		5770na5935na		
0900	1000	USA, WYFR Okeechobee FL	5950af	6855af
		6890af 7455af 9450af		
0900	1000	Vanuatu, Radio	4960do	
0905	0915	Croatia, Croatian Radio	12105au	12110au
0930	0945	Israel, Kol Israel	15640va	
0930	1000	Australia, Radio	9580as	9590as
		15240pa	15415pa	
0930	1000	Georgia, Radio Georgia	11910me	
0930	1000	UAE, Radio UNMEE	21460af	

## 1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1030	Australia, Voice Intl	11955as	13685as
1000	1030	Guam, AWR/KSDA	11930as	
1000	1030	Mongolia, Voice of	12085as	
1000	1030	UK, BBC World Service	9605as	9740as
		15310as	15360as	17760as
		21660as		
1000	1057	China, China Radio Intl	15210pa	17490pa
		17690pa		
1000	1059	New Zealand, Radio NZ Intl	9885pa	
1000	1100	Anguilla, Caribbean Beacon	11775am	
1000	1100	Australia, ABC NT Alice Springs	2310do	4835irr
1000	1100	Australia, ABC NT Katherine	2485do	
1000	1100	Australia, ABC NT Tennant Creek	2325do	
1000	1100	Australia, Radio	9580as	9590as
		15240pa	15415pa	
1000	1100	Canada, CFRX Toronto ON	6070do	
1000	1100	Canada, CFVP Calgary AB	6030do	
1000	1100	Canada, CKZN St John's NF	6160do	
1000	1100	Canada, CKZU Vancouver BC	6160do	
1000	1100	Costa Rica, University Network	5030va	6150va
		7375va9725va	11870va	13750va
1000	1100	Guyana, Voice of	3291do	5950do
1000	1100	India, All India Radio	7510pa	13710pa
		15235as	15260as	17800pa
1000	1100	Italy, IRRS 13840eu		
1000	1100	Japan, Radio	6120na	9695as
		17585eu	17720va	21755pa
1000	1100	Malaysia, Radio	7295as	
1000	1100	Malaysia, Voice of	15295as	
1000	1100	Netherlands, Radio	9790va	12065va
		13820va		13710va
1000	1100	Nigeria, Voice of	11770af	15120va
1000	1100	North Korea, Voice of	3560as	6185as
		6285as9335ca	9850ca	
1000	1100	Papua New Guinea, Catholic Radio		4960do
1000	1100	Papua New Guinea, NBC	4890do	
1000	1100	Singapore, Mediacorp Radio	6150do	
1000	1100	Solomon Islands, SIBC	5020do	9545do
1000	1100	South Africa, Channel Africa	11825af	
1000	1100	UK, BBC World Service	6190af	6195ca
		11760me	11940af	12095eu
		15565eu	15575me	17640va
		21470af		17885af
1000	1100	UK, BBC World Service	15190ca	15400af
		17830af		
1000	1100	USA, AFRTS	4319usb	5446usb
		6350usb	7590usb	7812usb
		12133usb	12579usb	13362usb
1000	1100	USA, KAJI Dallas TX	5755na	
1000	1100	USA, KTVN Salt Lake City UT		7505na
1000	1100	USA, KWHR Naalehu HI	9930as	11565as
1000	1100	USA, Voice of America	15615me	17555me
1000	1100	USA, WBCQ Kennebunk ME	5105na	
1000	1100	USA, WBOH Newport NC	5920am	
1000	1100	USA, WEWN Birmingham AL	5850na	7425na
		11875na		
1000	1100	USA, WHRI Noblesville IN	5860am	9930am
1000	1100	USA, WRMI Miami FL 7385am	9955am	
1000	1100	USA, WTJC Newport NC	9370na	
1000	1100	USA, WWCR Nashville TN	5070na	5770na
		5935na9985na		
1000	1100	USA, WYFR Okeechobee FL	5950am	6890am
		6890na7455na	9450na	11725am
1000	1100	USA, WHRI Noblesville IN	11565am	
1030	1045	Ethiopia, Radio	5990af	9704af
1030	1057	Czech Rep, Radio Prague Intl	9880eu	11615eu
1030	1058	Vietnam, Voice of	9840as	12020as
1030	1100	Iran, Voice of the Islamic Rep	15660as	17660as

1030	1100	UAE, Emirates Radio	13675va	15370va	15395va
		21605va			
1030	1100	UK, BBC World Service	9740as	15310as	
		17760as	17790as		
1030	1100	Vatican City, Vatican Radio	5885eu		

## 1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1104	vi	Pakistan, Radio	15100eu	17835eu
1100	1128		Vietnam, Voice of	7285as	
1100	1130		Australia, Radio	5995as	6020as
			9560as9580as	9590as	11880as
			15240pa		
1100	1130		Iran, Voice of the Islamic Rep	15660as	17660as
1100	1157		China, China Radio Intl	5960na	13665al
			17490na		
1100	1159	s	Germany, Overcomer Ministries	6110eu	
1100	1159	a	Germany, Universal Life	6055me	
1100	1200		Anguilla, Caribbean Beacon	11775am	
1100	1200		Australia, ABC NT Alice Springs	2310do	4835irr
1100	1200		Australia, ABC NT Katherine	2485do	
1100	1200		Australia, ABC NT Tennant Creek	2325do	
1100	1200		Australia, Voice Intl	13635as	13685as
1100	1200		Canada, CFRX Toronto ON	6070do	
1100	1200		Canada, CFVP Calgary AB	6030do	
1100	1200		Canada, CKZN St John's NF	6160do	
1100	1200		Canada, CKZU Vancouver BC	6160do	
1100	1200		Costa Rica, University Network	5030va	6150va
			7375va9725va	11870va	13750va
1100	1200		Ecuador, HCJB	12005am	21455am
1100	1200	vi	Greece, Voice of	9375eu	9420eu
			15630eu	15650eu	
1100	1200	vi/as	Italy, IRRS 13840eu		
1100	1200	vi	Italy, IRRS 15665va		
1100	1200		Japan, Radio	6120na	9695as
1100	1200		Malaysia, Radio	7295as	11730as
1100	1200		Malaysia, Voice of	15295as	
1100	1200		New Zealand, Radio NZ Intl	9885pa	
1100	1200		Nigeria, Voice of	11770af	15120va
1100	1200		Papua New Guinea, Catholic Radio		4960do
1100	1200		Papua New Guinea, NBC	4890do	
1100	1200		Singapore, Radio Singapore Intl	6080as	6150as
1100	1200		South Africa, Channel Africa	11825af	
1100	1200		Taiwan, Radio Taiwan Intl	7445as	
1100	1200		UK, BBC World Service	6190af	6195ca
			9740as11940af	11760me	12095eu
			15310as	15485va	15190ca
			17640va	17760as	15565eu
			17830af	21470af	17790va
1100	1200		Ukraine, Radio Ukraine Intl	15675eu	
1100	1200		USA, AFRTS	4319usb	5446usb
			6350usb	7590usb	7812usb
			12133usb	12579usb	13362usb
1100	1200		USA, KAJI Dallas TX	5755na	
1100	1200		USA, KTVN Salt Lake City UT		7505na
1100	1200		USA, KWHR Naalehu HI	9930as	11565as
1100	1200		USA, Voice of America	15615me	17555me
1100	1200		USA, WBCQ Kennebunk ME	5105na	
1100	1200		USA, WBOH Newport NC	5920am	
1100	1200		USA, WEWN Birmingham AL	5850na	7425na
			11875na		
1100	1200		USA, WHRI Noblesville IN	5753am	9930am
1100	1200	as	USA, WHRI Noblesville IN	11565am	
1100	1200		USA, WINB Red Lion PA	9320am	
1100	1200		USA, WJIE Louisville KY	7490am	
1100	1200		USA, WRMI Miami FL 7385am	9955am	
1100	1200		USA, WTJC Newport NC	9370na	
1100	1200		USA, WWCR Nashville TN	5070na	5770na
			5935na15825na		
1100	1200		USA, WYFR Okeechobee FL	5950am	6890am
			7355am	9555am	11725am
1130	1159	a	Germany, Universal Life	6055me	
1130	1200		Australia, Radio	5995as	6020as
			9560as9580as	9590as	11880as
1130	1200	as	Germany, Bible Voice Broadcasting	12065as	
1130	1200	t	UAE, Radio UNMEE	21550af	
1130	1200		UK, Wales Radio Intl	17625pa	
1130	1200		Vatican City, Vatican Radio	11625af	13765af
			15570af		
1145	1200	vi	Libya, Voice of Africa	17695af	21675af

## 1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1215	vi	Cambodia, National Radio	11940as	
1200	1230		France, Radio France Intl	15275af	17815as
			21620af		
1200	1230		Malaysia, Voice of	15295as	
1200	1230		UAE, AWR Africa	15135as	
1200	1230		Uzbekistan, Radio Tashkent	5060as	5975as
			6025as9715as		

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1200	1257	China, China Radio Intl	9730as	9795pa	
		11760pa	11980as	11760pa	13665al
		13790eu	17490eu		
1200	1259	New Zealand, Radio NZ Intl	9885pa		
1200	1300	Anguilla, Caribbean Beacon	11775am		
1200	1300	Australia, ABC NT Alice Springs	2310do	4835irr	
1200	1300	Australia, ABC NT Katherine	2485do		
1200	1300	Australia, ABC NT Tennant Creek	2325do		
1200	1300	Australia, Radio	5995as	6020as	9475as
		9560as 9580as	9590as	11880as	
1200	1300	Australia, Voice Intl	13635as	13685as	
1200	1300	Canada, CBC Northern Service	9625do		
1200	1300	Canada, CFRX Toronto ON	6070do		
1200	1300	Canada, CFVP Calgary AB	6030do		
1200	1300	Canada, CKZN St John's NF	6160do		
1200	1300	Canada, CKZU Vancouver BC	6160do		
1200	1300	Canada, Radio Canada Intl	9515as	13655am	
		17800am			
1200	1300	Costa Rica, University Network	9725va	11870va	
		13750va			
1200	1300	Ecuador, HCJB	12005am	21455am	
1200	1300	Italy, IRRS 13840eu			
1200	1300	Malaysia, Radio	7295as		
1200	1300	Nigeria, Voice of	11770af	15120va	
1200	1300	Papua New Guinea, Catholic Radio		4960do	
1200	1300	Papua New Guinea, NBC	4890do		
1200	1300	Singapore, Radio Singapore Intl	6080as	6150as	
1200	1300	South Korea, Radio Korea Intl	9650na		
1200	1300	Taiwan, Radio Taiwan Intl	7130as		
1200	1300	UK, BBC World Service	6190af	6195va	
		9740as 11760me	11940af	12095eu	15190ca
		15310as	15485va	15665va	17640va
		17760as	17790as	17830af	17885af
		21470af			
1200	1300	USA, AFRTS	4319usb	5446usb	5765usb
		6350usb	7590usb	7812usb	10320usb
		12133usb	12579usb	13362usb	13855usb
1200	1300	USA, KAJI Dallas TX	5755na		
1200	1300	USA, KTNB Salt Lake City UT		7505na	
1200	1300	USA, KWHR Naalehu HI	9930as	11565as	
1200	1300	USA, Voice of America	6110va	9645va	
		9760va 11705va	11715va	15665va	
1200	1300	USA, WBCQ Kennebunk ME	5105na	9330na	
		17495na			
1200	1300	USA, WBOH Newport NC	5920am		
1200	1300	USA, WEWN Birmingham AL	5850na	7425na	
		11875na			
1200	1300	USA, WHRI Noblesville IN	7535am	9495am	
		9930am			
1200	1300	USA, WINB Red Lion PA	9320am		
1200	1300	USA, WJIE Louisville KY	7490am		
1200	1300	USA, WRMI Miami FL 7385am	9955am		
1200	1300	USA, WTJC Newport NC	9370na		
1200	1300	USA, WWCR Nashville TN	5070na	5770na	
		5935na			
1200	1300	USA, WYFR Okeechobee FL	6890na	7355na	
		11530na	11970na		
1215	1300	Egypt, Radio Cairo	17670as		
1230	1245	Germany, Bible Voice Broadcasting	12065as		
1230	1245	Guam, TWR/KTWR	11750as		
1230	1258	Vietnam, Voice of	9840as	12020as	
1230	1300	Bangladesh, Bangla Betar	7185as		
1230	1300	Bulgaria, Radio	11700eu	15700eu	
1230	1300	Germany, Bible Voice Broadcasting	5890as		
1230	1300	Sri Lanka, SLBC	6005as	11930as	15745as
1230	1300	Sweden, Radio	13580va	15240na	15735va
1230	1300	Thailand, Radio	9810va		
1230	1300	Turkey, Voice of	15225va	15535eu	

## 1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1315	s	Germany, Bible Voice Broadcasting	5890eu	
1300	1320		Turkey, Voice of	15225va	15535eu
1300	1329		Czech Rep, Radio Prague Intl	13580eu	21745af
1300	1330		Ecuador, HCJB	12005am	21455am
1300	1330		Egypt, Radio Cairo	17670as	
1300	1330		France, Radio France Intl	9875eu	
1300	1356		Romania, Radio Romania Intl	15105eu	17745eu
1300	1357		China, China Radio Intl	7250va	9795pa
			11760pa	11885as	11990na
			11980as	15180na	15230na
					17625na
1300	1357	DRM	China, China Radio Intl	11810va	
1300	1400		Anguilla, Caribbean Beacon	11775am	
1300	1400		Australia, Radio	5995as	6020as
			9560as 9580as	9590as	9475as
1300	1400		Australia, Voice Intl	13635as	13685as
1300	1400		Canada, CBC Northern Service	9625do	
1300	1400		Canada, CFRX Toronto ON	6070do	
1300	1400		Canada, CFVP Calgary AB	6030do	
1300	1400		Canada, CKZN St John's NF	6160do	
1300	1400		Canada, CKZU Vancouver BC	6160do	
1300	1400		Canada, Radio Canada Intl	9515am	13655am

1300	1400		17800am		
			Costa Rica, University Network	9725va	11870va
			13750va		
1300	1400		Germany, Deutsche Welle	6140eu	
1300	1400		Malaysia, Radio	7295as	
1300	1400		New Zealand, Radio NZ Intl	6095pa	
1300	1400		Nigeria, Voice of	11770af	15120va
1300	1400		North Korea, Voice of	4405eu	7570eu
			9325na 11710na	12015eu	
1300	1400		Papua New Guinea, Catholic Radio		4960do
1300	1400		Papua New Guinea, NBC	4890do	
1300	1400		Singapore, Radio Singapore Intl	6080as	6150as
1300	1400		South Korea, Radio Korea Intl	9570as	9770as
1300	1400		Sri Lanka, SLBC	6005as	11930as
1300	1400		UK, BBC World Service	6190af	15745as
			9740as 11760me	11940af	6195va
			15420af	15310as	12095eu
			15575me	17640va	15485eu
			17830af	17885af	15565va
				21470af	17760as
1300	1400		USA, AFRTS	4319usb	21470af
			6350usb	7590usb	5446usb
			12133usb	12579usb	7812usb
					10320usb
					13855usb
1300	1400		USA, KAJI Dallas TX	5755na	
1300	1400		USA, KNLS Anchor Point AK		11765as
1300	1400		USA, KTNB Salt Lake City UT		7505na
1300	1400		USA, KWHR Naalehu HI		9930as
1300	1400		USA, Voice of America	6110va	9645va
			9760va 11705va		
1300	1400		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
1300	1400		USA, WBOH Newport NC	5920am	
1300	1400		USA, WEWN Birmingham AL	7425na	9955na
			15745na		
1300	1400		USA, WHRA Greenbush ME	17560na	
1300	1400		USA, WHRI Noblesville IN	9840am	9930am
			15105am		
1300	1400		USA, WINB Red Lion PA	13570am	
1300	1400		USA, WJIE Louisville KY	7490am	
1300	1400		USA, WRMI Miami FL 7385am	15725am	
1300	1400		USA, WTJC Newport NC	9370na	
1300	1400		USA, WWCR Nashville TN	7465na	9985na
			13845na		
1300	1400		USA, WWRB Manchester TN	9320na	12170na
1300	1400		USA, WYFR Okeechobee FL	7355va	7580va
			11830va	11855va	11970va
1305	1330	as	Austria, Radio Austria Intl	6155eu	13730eu
			17855va		
1315	1330	mtwhf	Austria, Radio Austria Intl	17855va	
1315	1330	a	Russia, TWR	7535eu	17855va
1330	1400		Guam, AWR/KSDA	11980as	7560as
1330	1400		Guam, AWR/KSDA	15275as	
1330	1400	mwhtfa	India, All India Radio	9690as	
1330	1400		Laos, National Radio	7145as	11620as
1330	1400		Serbia & Montenegro, Intl Radio		
1330	1400	mtwhf	South Korea, Radio Korea Intl	11835pa	
1330	1400		Sweden, Radio	9770eu	
1330	1400		UAE, Emirates Radio	15240na	15735va
			21605va	13675va	15395va
1330	1400		Uzbekistan, Radio Tashkent	5060as	5975as
			6025as 9715as		
1335	1400	as	Austria, Radio Austria Intl	6155eu	13730eu
			17855va		
1345	1400	mtwhf	Austria, Radio Austria Intl	6155eu	13730eu
			17855va		

## 1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	h	Germany, Bible Voice Broadcasting	17485as	
1400	1415		Russia, FEBA	9445as	
1400	1430		Australia, Radio	5995as	6080as
			9590as 11750pa		7240as
1400	1430		Australia, Voice Intl	13635as	13685as
1400	1430		Thailand, Radio	9725as	
1400	1445	a	Germany, Pan American BC	15650me	
1400	1457		China, China Radio Intl	7405na	9560as
			9700eu 9795eu	11765eu	13675as
			17630af		13685af
1400	1459		Canada, Radio Canada Intl	9515am	13655am
			17800am		
1400	1459		Poland, Radio Polonia	9525eu	11850eu
1400	1500		Anguilla, Caribbean Beacon	11775am	
1400	1500		Canada, CBC Northern Service	9625do	
1400	1500		Canada, CFRX Toronto ON	6070do	
1400	1500		Canada, CFVP Calgary AB	6030do	
1400	1500		Canada, CKZN St John's NF	6160do	
1400	1500		Canada, CKZU Vancouver BC	6160do	
1400	1500	DRM	China, China Radio Intl	9610va	
1400	1500		Costa Rica, University Network	9725va	11870va
			13750va		
1400	1500		France, Radio France Intl	9580va	17620va
1400	1500	as	Germany, Bible Voice Broadcasting	17485as	
1400	1500		Germany, Deutsche Welle	6140eu	

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1400	1500		Germany, Overcomer Ministries	6110eu	13810eu
1400	1500		India, All India Radio	9690as	
1400	1500		Japan, Radio	7200as	11840pa
1400	1500		Jordan, Radio	11690na	
1400	1500		Malaysia, Radio	7295as	
1400	1500		Netherlands, Radio	9345as	9890as
1400	1500		New Zealand, Radio NZ Intl	6095pa	11835as
1400	1500		Nigeria, Voice of	11770af	15120va
1400	1500		Oman, Radio	15140as	
1400	1500		Singapore, Mediacorp Radio		6150do
1400	1500		South Africa, Channel Africa		11825af
1400	1500		Sri Lanka, SLBC	6005as	11930as
1400	1500		Taiwan, Radio Taiwan Intl		15265as
1400	1500		UK, BBC World Service	6190af	6195as
			7105as 9740as	11940af	12095eu
			15310as	15485va	15565va
			17640va	17790as	17830af
			21660af		
1400	1500		USA, AFRTS	4319usb	5446usb
			6350usb	7590usb	7812usb
			12133usb	12579usb	13362usb
1400	1500		USA, KAIJ Dallas TX	13815na	
1400	1500		USA, KJES Vado NM	11715na	
1400	1500		USA, KTVN Salt Lake City UT		7505na
1400	1500		USA, KWHR Naalehu HI		9930as
1400	1500		USA, Voice of America	6110va	7125va
			9645va 9760va	11705va	15425va
1400	1500		USA, WBCQ Kennebunk ME		5105na
			9330na 17495na		7415na
1400	1500		USA, WBOH Newport NC		5920am
1400	1500		USA, WEWN Birmingham AL		9955na
			15745na		11530na
1400	1500		USA, WHRA Greenbush ME		17560na
1400	1500		USA, WHRI Noblesville IN		9840am
			15105am		9930am
1400	1500		USA, WINB Red Lion PA		13570am
1400	1500		USA, WJIE Louisville KY		7490am
1400	1500		USA, WRMI Miami FL 7385am		15725am
1400	1500		USA, WTJC Newport NC		9370na
1400	1500		USA, WWCR Nashville TN		7465na
			13845na		9985na
1400	1500		USA, WWRB Manchester TN		9320na
1400	1500		USA, WYFR Okeechobee FL		12170na
			11855va	13695va	17760va
1415	1430		Nepal, Radio	3230as	5005as
			7165as		6100as
1430	1445	s	Germany, Pan American BC		16650as
1430	1500		Australia, HCJB	15390as	
1430	1500	DRM	South Korea, Radio Korea Intl		9770eu
1445	1500	as	Germany, Pan American BC		15650me

## 1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1515	s	Germany, Pan American BC	15650as	
1500	1528	s	Hungary, Radio Budapest	6025eu	9655eu
1500	1528	mwhf	Romania, Radio Romania Intl	15725na	
1500	1528		Vietnam, Voice of	12020as	
1500	1530		France, Radio France Intl	9875eu	
1500	1530		Mongolia, Voice of	12015eu	
1500	1530		Sri Lanka, SLBC	6005as	11930as
1500	1530		UK, BBC World Service	6190af	15745as
			11940af	11860af	
			15485af	15420af	
			21660af	21470af	21490af
1500	1557		China, China Radio Intl	7160eu	7405na
			9435eu 9525eu	9785as	13675na
1500	1557		China, China Radio Intl		17730na
1500	1559	as	Canada, Radio Canada Intl	9515am	17630af
			17800am		13655am
1500	1600		Anguilla, Caribbean Beacon		11775am
1500	1600		Australia, HCJB	15390as	
1500	1600		Australia, Radio	5995as	6080as
			9590as 11750pa		7240as
1500	1600		Australia, Voice Intl		13635as
1500	1600		Canada, CBC Northern Service		9625do
1500	1600		Canada, CFRX Toronto ON		6070do
1500	1600		Canada, CFVP Calgary AB		6030do
1500	1600		Canada, CKZN St John's NF		6160do
1500	1600		Canada, CKZU Vancouver BC		6160do
1500	1600	DRM	China, China Radio Intl		9610va
1500	1600		Costa Rica, University Network		9725va
			13750va		11870va
1500	1600	m	Germany, Bible Voice Broadcasting		13590me
1500	1600		Germany, Deutsche Welle		6140eu
1500	1600		Germany, Overcomer Ministries		6110eu
1500	1600	vl/ as	Greece, Voice of	9420eu	9775eu
			15630eu	15650eu	15485eu
1500	1600		Guam, TWR/KTWR	12105as	
1500	1600		Japan, Radio	6190as	7200as
			11730as		9505va
1500	1600		Jordan, Radio		11690na
1500	1600		Malaysia, Radio		7295as

1500	1600		Netherlands, Radio	11835va	
1500	1600		New Zealand, Radio NZ Intl		6095pa
1500	1600		North Korea, Voice of		3560af
			7570eu 9335na	9990me	4405eu
					11545me
1500	1600		Russia, FEBA	7340as	
1500	1600		Russia, Voice of	5945as	6205as
			7350as 7415as	9900as	7260as
					11500as
1500	1600	as	Russia, Voice of	12060eu	
1500	1600		Singapore, Mediacorp Radio		6150do
1500	1600		South Africa, Channel Africa		11825af
1500	1600	DRM	Taiwan, Radio Taiwan Intl		17770af
1500	1600		UK, BBC World Service		9770eu
			7105as 9410eu	9740as	5975as
			15310as	15485eu	6195as
1500	1600	vl/ mtwhf	UK, Sudan Radio Service		12095eu
1500	1600		USA, AFRTS	4319usb	15565va
			6350usb	7590usb	15530va
			12133usb	12579usb	5446usb
1500	1600		USA, KAIJ Dallas TX		5765usb
1500	1600		USA, KJES Vado NM		7812usb
1500	1600		USA, KTVN Salt Lake City UT		13362usb
1500	1600		USA, KWHR Naalehu HI		13855usb
1500	1600		USA, Voice of America		15590na
			9795va 9825va	11835va	9930as
			15460va	17715af	11565as
1500	1600		USA, WBCQ Kennebunk ME		6110va
			9330na 17495na		9685va
1500	1600		USA, WBOH Newport NC		13865af
1500	1600		USA, WEWN Birmingham AL		15255va
			15745na		17895af
					5105na
1500	1600		USA, WHRA Greenbush ME		7415na
1500	1600		USA, WHRI Noblesville IN		5920am
			15105am		9955na
1500	1600		USA, WINB Red Lion PA		11530na
1500	1600		USA, WJIE Louisville KY		17560na
1500	1600		USA, WRMI Miami FL 7385am		9840am
1500	1600		USA, WTJC Newport NC		9930am
1500	1600		USA, WWCR Nashville TN		15105am
			13845na		13570am
1500	1600		USA, WWRB Manchester TN		7490am
1500	1600		USA, WYFR Okeechobee FL		15725am
			15210va	15520as	9370na
1530	1545	w	Germany, Pan American BC		7465na
1530	1545	s	Germany, Pan American BC		9985na
1530	1545		India, All India Radio		13845na
			11740va		9320na
1530	1600	a	Germany, Bible Voice Broadcasting		12170na
1530	1600	wh	Germany, Bible Voice Broadcasting		11615va
1530	1600	s	Germany, Bible Voice Broadcasting		11855va
1530	1600		Iran, Voice of the Islamic Rep		17760va
1530	1600	mtwhf	South Korea, Radio Korea Intl		17760va
1530	1600		UAE, AWR Africa		11610as
1530	1600		UK, BBC World Service		15650me
			15400af	17830af	9820va
1540	1600	whf	Germany, Bible Voice Broadcasting		9910va
1545	1600	a	Germany, Bible Voice Broadcasting		17510as
1545	1600	s	Germany, Pan American BC		17510as

## 1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1615	mwf	Germany, Bible Voice Broadcasting	13590me	
1600	1615		Pakistan, Radio	9390va	11850va
			15725va		
1600	1627		Czech Rep, Radio Prague Intl	5930eu	17485af
1600	1628		Vietnam, Voice of	7220va	9550va
			11630va		
1600	1630	s	Germany, Pan American BC	15650	su
1600	1630		Guam, AWR/KSDA	11640as	
1600	1630		Guam, TWR/KTWR	12105as	
1600	1630		Iran, Voice of the Islamic Rep	9635as	11650as
1600	1630		Myanmar, Radio	9730do	
1600	1630	as	Swaziland, TWR	6070af	
1600	1635		UAE, Emirates Radio	13630va	13675va
			21605va		15395va
1600	1645	h	Germany, Bible Voice Broadcasting	13590me	
1600	1650		New Zealand, Radio NZ Intl		6095pa
1600	1657		China, China Radio Intl		7255eu
			9525af 9570af	11900af	9435eu
1600	1657		China, China Radio Intl		7255eu
			9525eu 9570af	11900af	9435eu
1600	1700		Anguilla, Caribbean Beacon		17730na
1600	1700		Australia, Radio	5995as	11775am
			9475as 9710as		6080as
1600	1700		Australia, Voice Intl		7240as
1600	1700		Canada, CBC Northern Service		13635as
1600	1700		Canada, CFRX Toronto ON		9625do
1600	1700		Canada, CFVP Calgary AB		6070do
1600	1700		Canada, CKZN St John's NF		6030do
1600	1700		Canada, CKZU Vancouver BC		6160do
1600	1700	DRM	China, China Radio Intl		6160do
1600	1700		Costa Rica, University Network		17510va
1600	1700		Ethiopia, Radio	5990af	11870va
					13750va
					7110af
					7165af

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1600	1700		9560af 9704af 11800af France, Radio France Intl 15160af 15605af Germany, Deutsche Welle 17595as	9730af	11615af	
1600	1700		Greece, Voice of 15485na Jordan, Radio 11690na Malaysia, Radio 7295as	6170as	7225as	
1600	1700	vl	North Korea, Voice of 11545va	3560va	9990me	
1600	1700		Russia, Voice of 4940va 6005me 6130eu 7415as 9470me	4965va 4975va 7260as 7290eu		
1600	1700		South Korea, Radio Korea Intl Taiwan, Radio Taiwan Intl	5975va 9870va 11815as		
1600	1700		UK, BBC World Service 6190af 6195as 7160as 12095va 15190ca 15420af 15485va 17820af 17830af	3916as 5975as 9410eu 11940af 15310as 15400af 15565va 17790as 21470af 21660af		
1600	1700	vl/ mtwhf	UK, Sudan Radio Service UK, Voice Africa 13820af USA, AFRTS 4319usb 6350usb 7590usb 12133usb 12579usb	5446usb 5765usb 7812usb 10320usb 13362usb 13855usb		
1600	1700		USA, KALJ Dallas TX 13815na USA, KJES Vado NM 11715na USA, KTBN Salt Lake City UT USA, KWHR Naalehu HI	15590na 9930as 11565as 4930af 4960af 9760af 11835af 15445af 15460af		
1600	1700		USA, Voice of America 6160va 7125va 9645va 13600af 15240af 17715af 17895af	5105na 7415na		
1600	1700		USA, WBCQ Kennebunk ME 9330na 17495na USA, WBOH Newport NC USA, WEWN Birmingham AL 15745va	5920am 11530va 13615va		
1600	1700		USA, WHRA Greenbush ME USA, WHRI Noblesville IN 15105am	17650na 9840am 9930am		
1600	1700	mtwhf	USA, WINB Red Lion PA USA, WINB Red Lion PA USA, WJIE Louisville KY USA, WMLK Bethel PA USA, WRMI Miami FL 9955am USA, WTJC Newport NC USA, WWCR Nashville TN 13845na	9740am 13570as 7490am 9265eu 15725am 9370na 9985na 12160na		
1600	1700	as	USA, WWRB Manchester TN USA, WYFR Okeechobee FL 13695va 15520va 21455va	9320na 12170na 6085va 11830va 17690va 18980va		
1600	1700		Zambia, Radio Christian Voice Austria, Radio Austria Intl Austria, Radio Austria Intl UK, BBC World Service Egypt, Radio Cairo 9855af Guam, AWR/KSDA 11975as	9865af 13675na 13675na 11860af	21490af	
1600	1700	as	Austria, Radio Austria Intl Turkmenistan, Turkmen Radio Austria, Radio Austria Intl Germany, Bible Voice Broadcasting New Zealand, Radio NZ Intl	13675na 4930as 13675na 13590me 6095pa		

## 1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1710	mtwh	Moldova, Radio PMR 5960eu		
1700	1720	f	Moldova, Radio PMR 5960eu		
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af
1700	1730		Australia, Voice Intl 11840as	13635as	
1700	1730	DRM/ a	Canada, Voice of NASB	11900as	
1700	1730		France, Radio France Intl	11615af	15605af
1700	1730		Jordan, Radio 11690na		
1700	1745	DRM	China, China Radio Intl	12080va	
1700	1745		UK, BBC World Service 6190af 9630af 15420af	3255af 6005af	
1700	1755		South Africa, Channel Africa	15285af	
1700	1757		China, China Radio Intl 9570af 11900af	6100eu 7255eu	
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, Radio 5995as 9475as 9710as 11880pa	6080as 7240as	
1700	1800		Canada, CBC Northern Service	9625do	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Calgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800	DRM	China, China Radio Intl	17510va	
1700	1800		Costa Rica, University Network	11870va 13750va	
1700	1800		Egypt, Radio Cairo 9855af		
1700	1800		Eqi Guinea, Radio Africa	15190af	

1700	1800	twfas	Germany, Bible Voice Broadcasting	13590me	
1700	1800	vl	Greece, Voice of 15485na Japan, Radio 9535va Malaysia, Radio 7295as New Zealand, Radio NZ Intl Nigeria, Voice of 15120va Russia, Voice of 5910as 9470me 9830me Swaziland, TWR 3200af Taiwan, Radio Taiwan Intl UK, BBC World Service 6195eu 7160as 9410va 15310as 15400af 21470af	11970eu 15355af 6095pa 5945as 7415as 11815as 3915as 5975as 11750as 12095va 15565va 17820af	
1700	1800	vl/ mtwhf	UK, Sudan Radio Service UK, Voice Africa 13820af USA, AFRTS 4319usb 6350usb 7590usb 12133usb 12579usb	11715va 5446usb 5765usb 7812usb 10320usb 13362usb 13855usb	
1700	1800		USA, KALJ Dallas TX 13815na USA, KTBN Salt Lake City UT USA, KWHR Naalehu HI USA, Voice of America 13710af 15240af	15590na 9930as 4930af 4960af 15455af	
1700	1800		USA, WBCQ Kennebunk ME 9330na 17495na USA, WBOH Newport NC USA, WEWN Birmingham AL 15745va	5105na 7415na 5920am 5810va 11530va	
1700	1800		USA, WHRA Greenbush ME USA, WHRI Noblesville IN 15105am	17650na 9840am 9930am	
1700	1800	mtwhf	USA, WINB Red Lion PA USA, WJIE Louisville KY USA, WMLK Bethel PA USA, WRMI Miami FL 9955am USA, WTJC Newport NC USA, WWCR Nashville TN 13845na	9740am 7490am 9265eu 15265eu 15725am 9370na 12160na	
1700	1800		USA, WWRB Manchester TN USA, WYFR Okeechobee FL 17510va 18980va	9320na 12170na 3955eu 13595va 21455va 21680va	
1700	1800	as	Zambia, Radio Christian Voice USA, WINB Red Lion PA China, China Radio Intl Israel, Kol Israel 9345va Libya, Voice of Africa 11860af Russia, FEBA 9840as	4965af 13570am 12080va 15640va	
1700	1800	vl	UK, United Nations Radio 17810af Guam, AWR/KSDA 9385me Liberia, ELWA 4760do Philippines, Radio Pilipinas 15190pa	7150af 15495me 17810af 9385me 4760do 11730as 11890as	
1700	1800	vl	Slovakia, Slovak Radio Swaziland, TWR 9500af Sweden, Radio 6065va USA, Voice of America Paraguay, Radio Nacional Bangladesh, Bangla Betar India, All India Radio 7410eu 11620eu 11935af 15155af 17670af	5915eu 6055eu 9500af 6065va 11975af 17895af 9739as 7185as 9445af 9950eu 13605af 15075af	
1745	1800	vl	Libya, Voice of Africa 15220af 17695af	15615af 15660af	
1745	1800		UK, BBC World Service 17830af	3255af 6190af	

## 1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1815	DRM	China, China Radio Intl	12080va	
1800	1828		Vietnam, Voice of 5955eu	7280eu 11630as	
1800	1829	s	Germany, Universal Life	15675af	
1800	1830		Austria, AWR Europe 15280af		
1800	1830	DRM/ a	Canada, Radio Canada Intl	11900na	
1800	1830		Egypt, Radio Cairo 9855af		
1800	1830	a	Germany, Bible Voice Broadcasting	13590me	
1800	1830	s	Germany, Bible Voice Broadcasting	6015eu	
1800	1830		South Africa, AWR Africa	3215af 3345af	
1800	1830		UK, BBC World Service 21470af	6190af 11750as	
1800	1850		New Zealand, Radio NZ Intl	6095pa	
1800	1856		Romania, Radio Romania Intl	5965eu 7130eu	
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf	Argentina, RAE 9690eu	15345eu	
1800	1900		Australia, Radio 6080as 9580as 9710as 11880pa	7240as 9475as	
1800	1900		Australia, Voice Intl 11685as		
1800	1900		Bangladesh, Bangla Betar	7185as	
1800	1900		Canada, CBC Northern Service	9625do	
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	

# Shortwave Guide



1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		China, China Radio Intl	6100eu	12080va
1800	1900	DRM	China, China Radio Intl	17510va	
1800	1900		Costa Rica, University Network	11870va	13750va
1800	1900		Egt Guinea, Radio Africa	15190af	
1800	1900	f	Germany, Bible Voice Broadcasting	9430me	
1800	1900	vl	Greece, Voice of	7430eu	15485eu
1800	1900		India, All India Radio	7410eu	9950eu
			11620eu	11935af	15075af
			15155af	17670af	
1800	1900		Liberia, ELWA	4760do	
1800	1900		Malaysia, Radio	7295as	
1800	1900		Netherlands, Radio	6020af	9895af
1800	1900		Nigeria, Voice of	15120va	11655af
1800	1900		North Korea, Voice of	12015eu	4405eu
			Philippines, Radio Pilipinas	11730as	11890as
			15190pa		
1800	1900		Russia, Voice of	5910as	5945as
			7415as 9830me	11510af	7290eu
1800	1900	as	Russia, Voice of	5950eu	6175eu
1800	1900		South Africa, AWR Africa	9590af	9500af
1800	1900		Swaziland, TWR	3200af	9500af
1800	1900		Taiwan, Radio Taiwan Intl	3965eu	5975va
1800	1900		UK, BBC World Service	3255af	15400af
			6190af 6195eu	9410eu	12095va
			15420af	17830af	21470af
1800	1900		USA, AFRTS	4319usb	5765usb
			6350usb	7590usb	10320usb
			12133usb	12579usb	13362usb
			USA, KAJI Dallas TX	13815na	5765usb
1800	1900		USA, KLTN Salt Lake City UT	15590na	
1800	1900		USA, KWHR Naalehu HI	9930as	
1800	1900		USA, Voice of America	4930af	4960af
			6035af 11975af	13710af	15240af
1800	1900		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
1800	1900		USA, WBOH Newport NC	5920am	
1800	1900		USA, WEWN Birmingham AL	11530va	13615va
			15695va	15745va	
1800	1900		USA, WHRA Greenbush ME	17650na	
1800	1900		USA, WHRI Noblesville IN	9840am	9930am
			15105am		
1800	1900	mtwhf	USA, WINB Red Lion PA	9740am	
1800	1900	as	USA, WINB Red Lion PA	13570am	
1800	1900		USA, WJIE Louisville KY	7490am	
1800	1900		USA, WMLK Bethel PA	9265eu	15265eu
1800	1900		USA, WRMI Miami FL 9955am	15725am	
1800	1900		USA, WTJC Newport NC	9370na	
1800	1900		USA, WWCR Nashville TN	9985na	12160na
			13845na		
1800	1900		USA, WWRB Manchester TN	9320na	12170na
1800	1900		USA, WYFR Okeechobee FL	7240eu	13780eu
			15115eu	17535eu	18980eu
1800	1900		Yemen, Rep of Yemen Radio	9780me	
1800	1900		Zambia, Radio Christian Voice	4965af	
1815	1830	vl	Libya, Voice of Africa	9485af	11715af
			11860af	15660af	17695af
1830	1900		Bulgaria, Radio	5800eu	7500eu
1830	1900		Turkey, Voice of	9785eu	
1830	1900		UK, BBC World Service	6005af	9630af
1845	1858	mtwhfa	Albania, Radio Tirana 6115eu	7210eu	
1845	1900		Congo, RTV Congolaise	4765af	5985af
1851	1900		New Zealand, Radio NZ Intl	9845pa	

## 1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915		Congo, RTV Congolaise	4765af	5985af
1900	1915	fs	Germany, Bible Voice Broadcasting	9430me	
1900	1920		Turkey, Voice of	9785eu	
1900	1925		Israel, Kol Israel	11605va	15640va
1900	1928		Hungary, Radio Budapest	3975eu	6025eu
1900	1928		Vietnam, Voice of	7280eu	11630as
1900	1929	s	Germany, Universal Life	13820me	
1900	1930	a	Germany, Bible Voice Broadcasting	9430af	
1900	1930		Lithuania, Radio Vilnius	9710eu	
1900	1930	vl	Philippines, Radio Pilipinas	11730as	11890as
			15190pa		
1900	1945	DRM	China, China Radio Intl	12080va	
1900	1945		India, All India Radio	7410eu	9950eu
			11620eu	11935af	15075af
			15155af	17670af	
1900	1950		New Zealand, Radio NZ Intl	9845pa	
1900	1957		China, China Radio Intl	6100eu	7295af
			9440af 9585af		
1900	1959		Poland, Radio Polonia 7265eu	7270eu	
1900	2000		Anguilla, Caribbean Beacon	11775am	
1900	2000		Australia, Radio	6080as	9500as
			9580as 9710as	11880pa	
1900	2000		Australia, Voice Intl	11685as	
1900	2000		Canada, CBC Northern Service	9625do	

1900	2000		Canada, CFRX Toronto ON	6070do	
1900	2000		Canada, CFVP Calgary AB	6030do	
1900	2000		Canada, CKZN St John's NF	6160do	
1900	2000		Canada, CKZU Vancouver BC	6160do	
1900	2000		Canada, Radio Canada Intl	17765am	
1900	2000		Costa Rica, University Network	11870va	13750va
1900	2000		Egt Guinea, Radio Africa	15190af	
1900	2000		Germany, Deutsche Welle	13780af	15520af
1900	2000		Ghana, Ghana BC Corp	3366do	4915do
1900	2000	vl	Greece, Voice of	7430eu	15485eu
1900	2000	vl	Liberia, ELWA	4760do	
1900	2000		Malaysia, Radio	7295as	
1900	2000	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
1900	2000	as	Netherlands, Radio	15315na	17660na
1900	2000		Netherlands, Radio	7120af	9895af
			17810af		11655af
1900	2000		Nigeria, Radio/Ibadan	6050do	
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do
1900	2000		Nigeria, Radio/Lagos	3326do	4990do
1900	2000		Nigeria, Voice of	15120va	
1900	2000		North Korea, Voice of	3560va	7100eu
			11535eu	11910eu	9975eu
1900	2000		Papua New Guinea, Catholic Radio		4960do
1900	2000		Papua New Guinea, NBC	4890do	
1900	2000		Russia, Voice of	6175eu	6235eu
			7335eu 7400eu	11510af	7290eu
1900	2000		Sierra Leone, Radio UNAMSIL	6137do	
1900	2000	irreg/ vl	Sierra Leone, SLBS	3316do	
1900	2000		Solomon Islands, SIBC	5020do	9545do
1900	2000		South Africa, Channel Africa	3345af	
1900	2000	m	South Africa, SW Radio League	3215af	
1900	2000	a	South Korea, Radio Korea Intl	5975eu	7275eu
1900	2000		Sri Lanka, SLBC	6010eu	
1900	2000		Swaziland, TWR	3200af	
1900	2000		Thailand, Radio	9840eu	
1900	2000	vl	Uganda, Radio	4976do	5026do
1900	2000		UK, BBC World Service	6005af 6190af	3255af
			6195eu	6195eu	9410va
			12095af	15400af	17830af
1900	2000		USA, AFRTS	4319usb	5446usb
			6350usb	7590usb	7812usb
			12133usb	12579usb	13362usb
1900	2000		USA, KAJI Dallas TX	13815na	13855usb
1900	2000		USA, KJES Vado NM	15385na	
1900	2000		USA, KLTN Salt Lake City UT	15590na	
1900	2000		USA, Voice of America	4930af	4940af
			4960af 6035af	9785me	11975af
			13640af	13710af	12015af
			17895af		15240af
1900	2000		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
1900	2000		USA, WBOH Newport NC	5920am	
1900	2000		USA, WEWN Birmingham AL	11530va	13615va
			15695va	15745va	
1900	2000		USA, WHRA Greenbush ME	17650na	
1900	2000		USA, WHRI Noblesville IN	9840am	15665am
1900	2000	mtwhf	USA, WINB Red Lion PA	9740am	
1900	2000	as	USA, WINB Red Lion PA	13570am	
1900	2000		USA, WJIE Louisville KY	7490am	
1900	2000		USA, WMLK Bethel PA	9265eu	15265eu
1900	2000		USA, WRMI Miami FL 9955am	15725am	
1900	2000		USA, WTJC Newport NC	9370na	
1900	2000		USA, WWCR Nashville TN	9985na	12160na
			13845na		
1900	2000		USA, WYFR Okeechobee FL	3230va	6020va
			6085va 13695va	15565va	17510va
1900	2000	vl	Zambia, Radio Christian Voice	4965af	18980va
1900	2000		Zimbabwe, ZBC Corp 5975do		
1905	1915	vl	Croatia, Croatian Radio	6165na	13830na
1915	1930	s	Germany, Bible Voice Broadcasting	6015eu	
1915	1930	vl	Libya, Voice of Africa	11635af	11715af
1915	2000		China, China Radio Intl	12080va	
1925	1945		Armenia, Voice of	4810eu	9965as
1930	1945	vl	Libya, Voice of Africa	11715af	
1930	2000	mtwhf	Belarus, Radio	7105eu	7340eu
1930	2000	as	Germany, Bible Voice Broadcasting	9430af	
1930	2000		Iran, Voice of the Islamic Rep	7205eu	9800eu
			9925af 11660af	11670af	11860af
1930	2000		Serbia & Montenegro, Intl Radio	6100eu	
1930	2000	vl	Slovakia, Slovak Radio	5915eu	7345eu
1930	2000		Sweden, Radio	6065va	
1935	1955		Italy, RAI Intl	5960eu	9845eu
1945	2000	DRM	Canada, Radio Canada Intl	9800na	
1945	2000	vl	Rwanda, Radio	6055do	
1951	2000		New Zealand, Radio NZ Intl	11725pa	

## 2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600va
2000	2030		Australia, Voice Intl	11685as	
2000	2030	DRM	Canada, Radio Canada Intl	9800na	

# Shortwave Guide



2000	2030		Iran, Voice of the Islamic Rep	7205eu	9800eu	2030	2100		USA, Voice of America	6035af	11835as
			9925af 11660af 11670af	11860af					11975af 13710af	15240af	15580af
2000	2030		Mongolia, Voice of	12015eu		2030	2100	as	USA, Voice of America	4940af	
2000	2030		Swaziland, TWR	3200af		2045	2100		India, All India Radio	7410eu	9910eu
2000	2030		USA, Voice of America	11975af 13710af	4940af 6035af				9950eu 11620pa 11715pa		
			11975af 13710af	15240af 15580af		2050	2100		Vatican City, Vatican Radio	4005eu	5885eu
2000	2030		Vatican City, Vatican Radio	7365af 9755af					7250eu		
			11625af								
2000	2057		China, China Radio Intl	6100eu 5960af							
			7190af 7285af 7295eu	9440eu 9600eu							
			9855eu								
2000	2059	mtwhf	Spain, Radio Exterior Espana	9595af	9680eu						
2000	2100		Anguilla, Caribbean Beacon	11775am		2100	2110		Vatican City, Vatican Radio	4005eu	5885eu
2000	2100		Australia, ABC NT Alice Springs	2310do	4835irr				7250eu		
2000	2100		Australia, ABC NT Katherine	2485do		2100	2120		Turkey, Voice of	7170as	
2000	2100		Australia, ABC NT Tennant Creek	2325do		2100	2128		Hungary, Radio Budapest	6025eu	9525af
2000	2100	as	Australia, Radio	6080pa		2100	2130		Australia, ABC NT Katherine	2485do	
2000	2100		Australia, Radio	9500as 9580as	11650as	2100	2130		Australia, ABC NT Tennant Creek	2325do	
			11880pa 12080pa			2100	2130		Australia, Radio	9500as 13630pa	15515pa
2000	2100		Canada, CBC Northern Service	9625do		2100	2130	s	Belarus, Radio	7105eu	7340eu
2000	2100		Canada, CFRX Toronto ON	6070do		2100	2130		Cuba, Radio Havana	9505va	11760va
2000	2100		Canada, CFVP Calgary AB	6030do		2100	2130		South Korea, Radio Korea Intl	3955eu	
2000	2100		Canada, CKZN St John's NF	6160do		2100	2145	DRM	China, China Radio Intl	12080va	
2000	2100		Canada, CKZU Vancouver BC	6160do		2100	2145		Nigeria, Radio/Ibadan	6050do	
2000	2100	DRM	Canada, Radio Canada Intl	15325am	17765am	2100	2150		New Zealand, Radio NZ Intl	11725pa	
2000	2100		China, China Radio Intl	12080va		2100	2157		China, China Radio Intl	7190eu	5960af
2000	2100		Costa Rica, University Network	13750va					7285af 9600eu 9855af	11640af	13630eu
2000	2100		Egt Guinea, Radio Africa	15190af					13630af		
2000	2100		Germany, Deutsche Welle	7130af	11865af	2100	2157	DRM	Netherlands, Radio	15150eu	
			13780af 15205af			2100	2159		Canada, Radio Canada Intl	153325eu	
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do	2100	2200		Anguilla, Caribbean Beacon	11775am	
2000	2100	vl	Greece, Voice of	15485va		2100	2200		Australia, ABC NT Alice Springs	2310do	4835irr
2000	2100		Indonesia, Voice of	9525as 11785pa	15150af	2100	2200		Austria, AWR Europe	9715af	
2000	2100	vl	Italy, IRRS 5775eu			2100	2200		Canada, CBC Northern Service	9625do	
2000	2100		Liberia, ELWA	4760do		2100	2200		Canada, CFRX Toronto ON	6070do	
2000	2100		Malaysia, Radio	7295as		2100	2200		Canada, CFVP Calgary AB	6030do	
2000	2100	vl	Namibia, Namibian BC Corp	6060do 6175do	3270do 3290do	2100	2200		Canada, CKZN St John's NF	6160do	
2000	2100		Netherlands, Radio	7120af	9895af 11655af	2100	2200	DRM	Canada, CKZU Vancouver BC	6160do	
			17810af			2100	2200		Canada, Radio Canada Intl	9800na	
2000	2100		New Zealand, Radio NZ Intl	11725pa		2100	2200		Costa Rica, University Network	13750va	
2000	2100		Nigeria, Radio/Ibadan	6050do		2100	2200		Egypt, Radio Cairo	15375af	
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	2100	2200		Egt Guinea, Radio Africa	15190af	
2000	2100		Nigeria, Radio/Lagos	3326do 4990do		2100	2200		Germany, Deutsche Welle	9440af	11865af
2000	2100		Nigeria, Voice of	15120va					15205af		
2000	2100		Papua New Guinea, Catholic Radio		4960do	2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do
2000	2100		Papua New Guinea, NBC	4890do		2100	2200	vl	Greece, Voice of	15485va	17565va
2000	2100		Russia, Voice of	6145eu 6235eu	7290eu	2100	2200		Guyana, Voice of	3291do	5950do
			7300eu 7330eu			2100	2200		India, All India Radio	7410eu	9910eu
2000	2100		Sierra Leone, Radio UNAMSIL	6137do		2100	2200	vl	9950eu 11620pa 11715pa		
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do	2100	2200		Italy, IRRS 5775eu		
2000	2100		South Africa, AWR Africa	7175af		2100	2200		Japan, Radio	6035pa	6055eu
2000	2100	vl	Uganda, Radio	4976do	7196do	2100	2200		11855af	17825na	21670pa
2000	2100		UK, BBC World Service	3255af 6005af		2100	2200		Liberia, ELWA	4760do	
			6195af 9410af 9630af	12095af 15400af		2100	2200	vl	Malaysia, Radio	7295as	
			17830af			2100	2200		Namibia, Namibian BC Corp	3270do 3290do	
2000	2100	f	UK, Wales Radio Intl	7210eu		2100	2200		6060do 6175do		
2000	2100		USA, AFRTS	4319usb 5446usb	5765usb	2100	2200		Nigeria, Radio/Kaduna	4770do	6090do
			6350usb 7590usb	7812usb 10320usb		2100	2200		Nigeria, Radio/Lagos	3326do 4990do	
			12133usb 12579usb	13362usb 13855usb		2100	2200		North Korea, Voice of	4405eu 7570eu	12015eu
2000	2100		USA, KALJ Dallas TX	13815na		2100	2200		Papua New Guinea, Catholic Radio		4960do
2000	2100		USA, KJES Vado NM	15385na		2100	2200	vl	Papua New Guinea, NBC	4890do	
2000	2100		USA, KTNB Salt Lake City UT	15590na		2100	2200		Rwanda, Radio	6055do	
2000	2100		USA, WBCQ Kennebunk ME	5105na 7415na		2100	2200	irreg/ vl	Sierra Leone, Radio UNAMSIL	6137do	
			9330na 17495na			2100	2200		Sierra Leone, SLBS	3316do	
2000	2100		USA, WBOH Newport NC	5920am		2100	2200		South Africa, Channel Africa	3345af	
2000	2100		USA, WEWN Birmingham AL	11530va 13615va		2100	2200		Syria, Radio Damascus	12085eu	13610eu
			15745va 17595va			2100	2200		UK, BBC World Service	3255af 3915as	6195va
2000	2100		USA, WHRA Greenbush ME	17650na					5965as 5975ca 6005af	6190af	
2000	2100		USA, WHRI Noblesville IN	9840am	15665am				9410va 9605af 12095ca	15400af	
2000	2100		USA, WINB Red Lion PA	9740am		2100	2200		Ukraine, Radio Ukraine Intl	7420eu	
2000	2100	as	USA, WINB Red Lion PA	13570am		2100	2200		USA, AFRTS	4319usb 5446usb	5765usb
2000	2100		USA, WJIE Louisville KY	7490am		2100	2200		6350usb 7590usb	7812usb 10320usb	
2000	2100		USA, WMLK Bethel PA	9265eu 15265eu		2100	2200		12133usb 12579usb	13362usb 13855usb	
2000	2100		USA, WRMI Miami FL 9955am	15725am		2100	2200		USA, KALJ Dallas TX	13815na	
2000	2100		USA, WTJC Newport NC	9370na		2100	2200		USA, KTNB Salt Lake City UT	15590na	
2000	2100		USA, WWCR Nashville TN	9985na 12160na		2100	2200		USA, Voice of America	4930af	4960af
			13845na			2100	2200		6035af 11975af 13710af	15580af	
2000	2100		USA, WWRB Manchester TN	9320na 12170na					USA, WBCQ Kennebunk ME	5105na 7415na	
2000	2100		USA, WYFR Okeechobee FL	3230va 5810va	15195va	2100	2200		9330na 17495na		
			6020va 7360va 7580va	15115va		2100	2200		USA, WBOH Newport NC	5920am	
			17510va 17535va	17575va		2100	2200		USA, WEWN Birmingham AL	11530va 13615va	
2000	2100		Zambia, Radio Christian Voice	4965af					15745va 17595va		
2000	2100	vl	Zimbabwe, ZBC Corp 5975do			2100	2200		USA, WHRA Greenbush ME	9455na	
2005	2100		Syria, Radio Damascus	12085eu	13610eu	2100	2200		USA, WHRI Noblesville IN	9840am	15665am
2015	2100		China, China Radio Intl	12080va		2100	2200		USA, WINB Red Lion PA	13570am	
2025	2045		Italy, RAI Intl	6050af		2100	2200		USA, WJIE Louisville KY	7490am	
2030	2045	vl	Libya, Voice of Africa	11635af		2100	2200		USA, WMLK Bethel PA	15265eu	
2030	2045		Thailand, Radio	9535eu		2100	2200		USA, WRMI Miami FL 9955am	15725am	
2030	2058		Vietnam, Voice of	5955va	7220va 7280va	2100	2200		USA, WTJC Newport NC	9370na	
			9550va 11630va			2100	2200		USA, WWCR Nashville TN	9985na 12160na	
2030	2100		Cuba, Radio Havana	9505va	11760va				13845na		
2030	2100		Egypt, Radio Cairo	15375af		2100	2200		USA, WWRB Manchester TN	9320na 12170na	
2030	2100		Turkey, Voice of	7170as		2100	2200		USA, WYFR Okeechobee FL	5810va 7360va	
									7580va 15565va 17510va	17535va 17575va	

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2100	2200		Zambia, Radio Christian Voice	4965af	
2100	2200	vl	Zimbabwe, ZBC Corp	5975do	
2110	2130	mtwhf	UK, BBC World Service	11675ca	15390ca
2115	2130	vl	Libya, Voice of Africa	11635af	
2115	2157		China, China Radio Intl	21080va	
2115	2200		Egypt, Radio Cairo	9990eu	
2130	2145	tf	UK, BBC World Service	11680ca	
2130	2156		Romania, Radio Romania Intl	6015eu	6055eu
			7145eu 9540na		
2130	2157		Czech Rep, Radio Prague Intl	9800af	11600na
2130	2158	mtwhfa	Albania, Radio Tirana	7120eu	
2130	2200		Australia, ABC NT Katherine	5025do	
2130	2200		Australia, ABC NT Tennant Creek	4910do	
2130	2200		Australia, Radio	9660as	12080as
			13630pa 15515pa		
2130	2200		Sweden, Radio	6065va	7420va
2130	2200		UK, Wales Radio Intl	7110eu	
2130	2200		Uzbekistan, Radio Tashkent	5025eu	7185eu
			11905eu		
2150	2200		New Zealand, Radio NZ Intl	15720pa	

## 2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2205		Syria, Radio Damascus	12085eu	13610eu
2200	2230	DRM	Germany, Deutsche Welle	9800as	
2200	2230		India, All India Radio	7410eu	9910eu
			9950eu 11620pa 11715pa		
2200	2230	vl	Italy, IRRS 5775eu		
2200	2230		Serbia & Montenegro, Intl Radio	6100eu	
2200	2230		USA, Voice of America	11835as	
2200	2245		Egypt, Radio Cairo	9990eu	
2200	2250		Turkey, Voice of	9830as	
2200	2257		China, China Radio Intl	7170eu	
2200	2257	DRM	Netherlands, Radio	15525na	
2200	2259	as	Spain, Radio Exterior Espana	9595af	9680eu
2200	2300		Anguilla, Caribbean Beacon	6090am	
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek	4910do	
2200	2300		Australia, Radio	13620as	15230pa
			15240pa 15515pa		
2200	2300		Bulgaria, Radio	5800eu	7500eu
2200	2300		Canada, CBC Northern Service	9625do	
2200	2300		Canada, CFRX Toronto ON	6070do	
2200	2300		Canada, CFVP Calgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300		Costa Rica, University Network	13750va	
2200	2300		Eqt Guinea, Radio Africa	15190af	
2200	2300		Germany, Deutsche Welle	7115as	9720as
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do
2200	2300		Guyana, Voice of	3291do	
2200	2300		Malaysia, Radio	7295as	
2200	2300	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do 6175do		
2200	2300		New Zealand, Radio NZ Intl	15720pa	
2200	2300		Nigeria, Radio/Ibadan	6050do	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos	3326do	4990do
2200	2300		Papua New Guinea, Catholic Radio		4960do
2200	2300		Papua New Guinea, NBC	9675do	
2200	2300	irreg/ vl	Sierra Leone, Radio UNAMSIL	6137do	
2200	2300	vl	Sierra Leone, SLBS	3316do	
2200	2300		Solomon Islands, SIBC	5020do	9545do
2200	2300		Taiwan, Radio Taiwan Intl	9355eu	
2200	2300		UK, BBC World Service	5965as	5975ca
			6195va 7105as 9605af		11685as
			12095ca 15400af		
2200	2300		USA, AFRTS	4319usb	5446usb
			6350usb 7590usb		10320usb
			12133usb 12579usb		13362usb
2200	2300		USA, KAIJ Dallas TX	13815na	
2200	2300		USA, KTNB Salt Lake City UT		15590na
2200	2300		USA, KWHR Naalehu HI	11565as	17510as
2200	2300		USA, Voice of America	7215va	9890va
			15185va 15290va		15305va
2200	2300		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Birmingham AL	9975va	11530va
			15695va 15745va		
2200	2300		USA, WHRA Greenbush ME	9455na	
2200	2300		USA, WINB Red Lion PA	13570am	
2200	2300		USA, WJIE Louisville KY	13595am	
2200	2300		USA, WRMI Miami FL 9955am	15725am	
2200	2300		USA, WRMI Miami FL 9955am	15725am	
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Nashville TN	7465na	9985na
			12160na 13845na		
2200	2300		USA, WWRB Manchester TN	9320na	12170na
2200	2300		USA, WYFR Okeechobee FL	5810va	9690va
			11740va 21525va		
2200	2300		Zambia, Radio Christian Voice	4965af	

2205	2230		Italy, RAI Intl	11895as	
2230	2257		Czech Rep, Radio Prague Intl	7345na	9415na
2230	2259		Canada, Radio Canada Intl	6160as	7195as
			9730as		
2230	2300	DRM	Canada, Radio Canada Intl	9800na	
2230	2300		Guam, AWR/KSDA	11850as	15320as
2230	2300	vl/fs	Italy, IRRS 5775eu		
2230	2300		USA, Voice of America	9545va	9785va
			11935as 13755va		
2245	2300		India, All India Radio	9705as	9950as
			11645as 13605as		11620as

## 2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek	4910do	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		Costa Rica, University Network	13750va	
2300	0000		Cuba, Radio Havana	9550na	
2300	0000		Egypt, Radio Cairo	7115na	
2300	0000		Germany, Deutsche Welle	5955as	9890as
			15135as		
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of	3291do	
2300	0000		India, All India Radio	9705as	9950as
			11645as 13605as		
2300	0000		Malaysia, Radio	7295as	
2300	0000	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do 6175do		
2300	0000		New Zealand, Radio NZ Intl	15720pa	
2300	0000		Papua New Guinea, Catholic Radio		4960do
2300	0000		Papua New Guinea, NBC	9675do	
2300	0000		Sierra Leone, Radio UNAMSIL	6137do	
2300	0000	irreg/ vl	Sierra Leone, SLBS	3316do	
2300	0000		Singapore, Mediastar Radio	6150do	
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do
2300	0000		UK, BBC World Service	3915as	5965as
			5975ca 6170as 6195as		7105as
			11685as 11945as		11955as
			15280as		12095ca
2300	0000		USA, AFRTS	4319usb	5446usb
			6350usb 7590usb		7812usb
			12133usb 12579usb		13362usb
2300	0000		USA, KAIJ Dallas TX	13815na	
2300	0000		USA, KTNB Salt Lake City UT		15590na
2300	0000		USA, KWHR Naalehu HI	11565as	17510as
2300	0000		USA, Voice of America	7215va	9890va
			11995as 15185va		15290va
			17740va		
2300	0000		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birmingham AL	7425va	9975va
			11530va 15695va		
2300	0000		USA, WHRA Greenbush ME	9455na	
2300	0000		USA, WINB Red Lion PA	9320am	
2300	0000		USA, WJIE Louisville KY	13595am	
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000		USA, WWCR Nashville TN	5070na	7465na
			9985na 13845na		
2300	0000		USA, WWRB Manchester TN	5050na	5085na
			5745na 6890na		
2300	0000		USA, WYFR Okeechobee FL	5985am	11740am
			11855am 15170am		15400am
2300	0000		Zambia, Radio Christian Voice	4965af	
2300	2315		Nigeria, Radio/Kaduna	4770do	6090do
2300	2315		Nigeria, Radio/Lagos	3326do	
2300	2330		Australia, Radio	9660as	12080as
			13630pa 15230pa		15240pa
			21740pa		
2300	2330		USA, Voice of America	6180va	7205va
			9780va 11655va 15150va		
2300	2356		Romania, Radio Romania Intl	6135eu	6180eu
			7105eu 9610na		
2300	2357		China, China Radio Intl	5975as	5990na
			6040na 7180as		
2315	2330	vl	Croatia, Croatian Radio	7285as	
2330	0000		Australia, Radio	9660as	12080as
			13630pa 15230pa		15415pa
			17795pa 21740pa		
2330	0000		Lithuania, Radio Vilnius	7325na	
2330	0000		USA, Voice of America	6180va	7130va
			7205va 9620va 9780va		11665va
			13640va 15150va		15205va
2330	2358		Vietnam, Voice of	9840as	12020as
2335	0000	as	Austria, Radio Austria Intl	9870as	
2340	0000	mtwhf	Austria, Radio Austria Intl	9870as	

## Aero Monitoring on the Space Coast

**A**nytime the space shuttle is launched, communications activity is not confined to the land mobile radio spectrum. There is also quite a bit of activity on military and civilian aircraft frequencies by NASA and Department of Defense aircraft in support of a shuttle launch.

### DoD is the Main Launch Player

The Department of Defense Manned Space (DDMS) Flight Support Office coordinates all DoD contingency support to our nation's manned space flight programs. Chartered in 1958 by the Secretary of Defense, DDMS was originally formed with the express purpose of providing much needed DoD support to our initial manned space flight effort.

Since those early days, this support office has continued to be the focal point for all DoD contingency support to Project Mercury, Gemini, Apollo, Apollo/Soyuz Test Project and the Space Shuttle program. This support includes astronaut and spacecraft recovery, worldwide communications, tracking and data relay, public affairs, and medical support.

The commander of the U.S. Strategic Command (USSTRATCOM) is the manager for this program, and the 45th Space Wing commander at Patrick AFB, Florida, is his deputy manager. The DDMS offices and staff are located at Patrick and are responsible for the day-to-day operations and support to NASA's manned space flights. Additionally, DDMS maintains a landing support office at the Johnson Space Center in Houston, Texas.

In the space shuttle program, DDMS has the responsibility for astronaut rescue and recovery, contingency landing site support, payload security, medical support, coordination of airlift/sealift for contingency operations, as well as other support services required in the event of a shuttle emergency.

In the Kennedy Space Center area, U.S. Air Force air refueled H-60 helicopters, HC-130 tanker aircraft, pararescue and medical personnel; and U.S. Navy and Coast Guard ships are deployed to support launch contingencies and astronaut recovery. Additionally, the Navy provides a Marine KC-130 tanker for refueling the helicopters, E-2C aircraft for enhanced air traffic control and P-3 aircraft for search and rescue operations in the mid-Atlantic region.

To support the potential for a Transoceanic Abort Landing (TAL), NASA has selected four TAL sites in Spain and Africa. These sites are Moran and Zaragoza Air Bases in Spain; Ben Guerir, Morocco; and Yundum Inter-

national Airport, Banjul, The Gambia. Three of these four TAL sites are activated for each shuttle launch. DDMS supports these TAL sites with C-12 or C-21 aircraft for on-scene weather reconnaissance and in-flight checks of space shuttle unique landing aids; C-130 aircraft with pararescue and medical support personnel; and DoD fire/crash/rescue equipment and personnel.

DDMS operates the DoD Support Operations Center at Patrick starting the day prior to a space shuttle launch and continuing through landing. Manned by staff officers, the support operations center maintains 24-hour contact with those DoD forces and facilities around the world supporting each mission. The center is the DoD focal point for managing a contingency response in the event of a shuttle emergency landing or astronaut bail out. The center, for example, played a key role in providing support to NASA in response to the Space Shuttle *Columbia* disaster in 2003.

While a shuttle is on orbit, designated DoD sites worldwide are ready to support a shuttle contingency landing. The center receives status reports from these locations during mission support periods. On landing day, the support operations center coordinates the DoD fire/crash/rescue support and medevac helicopters at Kennedy Space Center, Edwards Air Force Base, California, and Holloman Air Force Base, New Mexico.

After landing at locations other than Kennedy Space Center, the shuttle is ferried back to Florida on a modified Boeing 747 Shuttle Carrier Aircraft. DDMS coordinates a U.S. Air Force C-141 "Pathfinder" aircraft to transport NASA personnel and equipment supporting ferry flight operations.



*Shuttle being ferried by carrier aircraft (NASA photo)*

The office personnel fly with the NASA team on these ferry flights, providing specialized support en route at DoD installation stops.

Due to the unique weather sensitivities of ferry flights, a dedicated weather support team is also assembled to monitor en route weather. This includes a DoD meteorologist to monitor weather conditions from the Cape Canaveral Forecast Facility in Florida, as well as a DoD meteorologist who travels with the ferry flight team, providing direct en route weather support.

### The NASA STA

In addition to the T-38 aircraft based at Ellington AFB, Texas, used by the NASA astronauts for training and cross country trips,



*NASA STA aircraft landing at KSC (NASA)*

NASA has four very special aircraft to train mission commanders and pilots in landing the shuttle. This training is conducted using a Shuttle Training Aircraft (STA) that is designed to simulate space shuttle flight characteristics during flight from approximately 35,000 feet to touch down. Its seats are identical to those of a space shuttle, which enables the crew to acquire an accurate sense of the shuttle landing.

The space shuttle is both a spaceship and an airplane; thus, when training a shuttle crew member, both spaceflight and atmospheric flight must be taught.

STA is a modified Grumman Gulfstream II aircraft with an onboard special computer system to enable the aircraft to simulate the orbiter. That onboard computer, named the Advanced Digital Avionics System (ADAS), simulates mode controls, the direct lift control (DLC) and the in-flight reverse thrust, as well as the conventional aircraft control of the shuttle during the landing phase.

NASA has four of these customized aircraft, most of which are kept at the NASA Forward Operating Location in El Paso, Texas. The fleet is rotated through Ellington Field for maintenance as needed.

Most of the STA training takes place at the White Sands Space Harbor, a part of the White Sands Test Facility in New Mexico. The location is ideal because it not only has an actual Shuttle landing strip – an STA training requirement – but it provides more remote, undisturbed airspace than its counterparts at Kennedy Space Center and at Edwards Air Force Base in California.

Astronauts are shuttled to El Paso on their T-38 NASA aircraft. Each STA training session includes 10 approaches and landings. After a session, the training crew refuels the aircraft, picks up a different astronaut and begins again.

## Monitoring NASA Comms

So where can you catch NASA and DoD aircraft comms associated with the space shuttle program? In our exclusive list below we have two different lists – a nationwide list and some of the main frequencies used in the Kennedy Space Center area and the Eastern Test Range (ETR).

### General NASA Frequencies

ETR contingency search and rescue: 11440 kHz (USB)  
 ETR support: 264.800 284.100 291.800 (AM mode)  
 HF Air-to-Ground: 3089.5 6743.5 9003.5 11192.5 15062.5 kHz (All USB)  
 NASA VHF/UHF Air-to-Air: 123.050 123.125 (T-38 interplane) 123.350 126.650 (NASA Weather aircraft/Shuttle training aircraft) 230.650 235.400 (T-38 interplane) 351.000 (All AM)  
 Search and Rescue Operations: 282.800 (AM mode)

### Eastern Test Range

Air Rescue Support: 46.650 (FM) 138.450 "DoD Cape and Jolly/King" (AM)  
 Air-to-Ground Support (Aerial Refueling)"Jolly" (AM): 253.000  
 Clearance function: 2638 kHz (USB)  
 FACSAC Jacksonville (Navy) Warning Area

Coordination Net: 120.950 133.950 134.650 135.825 267.500 270.600 284.500 307.200 349.900 369.900 385.100 (AM)  
 Launch Operations: 266.200 308.950 320.050 (AM)  
 Pegasus Mission Support: 128.150 (AM)  
 Range Control/Support: 133.800/264.800 "Cape Control" 320.200 "Cape Radio" 324.700 340.800 349.600 "DoD Cape" 350.600 Net 5 Alpha (AM)  
 Range Projects: 270.000 (AM)  
 Range Safety Support: 46.650 (FM) 125.900 "Variety" 141.300 "Variety" 229.000 294.600 "Cape Leader/Variety" (AM)  
 SRB Recovery Net Discrete: 310.000 "Liberty Star/Raven 2" (AM)

### Kennedy Shuttle Landing Facility (KX68)(All AM mode)

Approach/Departure (Daytona): 132.650/281.425 (South) 134.950/239.275 (North)  
 Civilian/Military Guard/Emergency: 121.500 243.000  
 Civilian Traffic Advisory: 123.600  
 Ground Control: 121.750  
 Orbiter to ground: 259.700 279.000 (also EVA) 296.800  
 Shuttle Launch Air Support (Weather/Shuttle training aircraft): 126.650  
 Tower Local/Helicopter Control: 128.550/284.000

### Cape Skid Strip (KXMR)(All AM mode)

Approach/Departure (Daytona): 132.650/281.425 (South) 134.950/239.275 (North)  
 ASOS Weather: 119.325  
 Tower: 118.625/393.000 126.200  
 Weather: 344.600 "Cape Metro"  
 Note: 118.625 Cape Tower has been heard also on 136.650 and 138.450

### Patrick AFB/Cocoa Beach (KC0F)

920th Rescue Wing Air-to-Air (Refueling): 138.475 "Jolly/King" (AM)  
 920th Rescue Wing Parajump Air-to-Ground (Judy Drop Zone): 251.900 "Jolly/King" (AM)  
 920th Rescue Wing Search and Rescue Contingency/Training: 236.000 (AM)  
 920th Rescue Wing/39RQS Operations: 321.000 "King Ops" (AM)  
 920th Rescue Wing/301RQS Air-to-Air: 46.650 "Jolly" (FM)  
 920th Rescue Wing/301RQS Operations: 255.500 "Jolly Ops" (AM)  
 Air Show Boss (2001 air show): 121.050/257.425 (AM)  
 Air Show SAR Demonstration (2001 air show): 122.925 (AM)  
 ALCP (Global HF through Cape Radio) 139.050/383.0 (AM)  
 Approach (Single Frequency): 126.400/290.800 (AM)  
 Approach/Departure (Daytona): 132.650/281.425 (South) 134.950/239.275 (North)  
 Approach/Departure Control (Regional): 290.800 297.200 358.300 369.200 372.800 378.800 (AM)  
 Automatic Terminal Information Service: 119.175/273.500 (AM)  
 Clearance Delivery: 118.400/289.400 (AM)  
 Consolidated Command Post: 138.300 383.000 "MAYAAP" (AM)  
 Flight Check (Federal Aviation Administration): 135.850 (AM)  
 Ground Control: 124.350/335.800 (AM)  
 NASA ER-2 Operations: 138.025 290.800 328.025 378.800 (AM)  
 NORAD Air Defense Air-to-Ground: 148.125

282.400 364.200 (AM)  
 Pilot-to-Dispatcher (PTD): 139.300/372.200 (AM)  
 Search and Rescue Training: 236.000 251.900 252.800 259.000 (AM)  
 Tower: 133.750/269.375 372.800 (AM)  
 Training Operations: 225.350 316.275 351.200 363.900 383.200 385.700 395.100 (All AM)  
 Weather (Metro): 344.600 (AM)

### Melbourne International Airport (KLMB)(All AM mode unless otherwise indicated)

ATIS: 132.550  
 Approach/Departure (Daytona): 134.950/239.275 (North)  
 Flight Service Station (St. Petersburg FSS): 123.600 (Titusville RCO)  
 Ground Control/Clearance Delivery: 121.900  
 Northrup-Grumman Operations: 123.200  
 TACAN (Titusville-TTS): 1146.0000 (Channel 59Y)  
 Tower: 118.200 124.050 257.800  
 Unicom: 122.950

### Space Coast Regional Airport (KTIX)(All AM mode unless otherwise indicated)

Air Scan Inc: 123.475 "Bat Cave"  
 Approach/Departure (Daytona): 134.950/239.275 (North)  
 ATIS: 120.625  
 Flight Service Station (St. Petersburg FSS): 123.600 (Titusville RCO)  
 Ground Control: 121.850  
 Helicopter Control: 119.875  
 Tower: 118.900  
 Unicom: 122.950 123.025 (Helicopter)

### Miami ARTCC – Melbourne RCAG

133.475/269.300 128.650/343.700 135.075/348.700 119.825/379.250

## ❖ 380-400 MHz DoD LMR Trunk Update

As most of you who regularly follow this column know, we are closely tracking new trunk systems that are coming online in the new land mobile radio band from 380-400 MHz.

Gary Mitchelson reported on the SCAN-DC message board a new P25 control channel on 380.0750. He theorizes this might be a Fort Detrick trunk system control channel.

Another report we have received from Maryland by an anonymous contributor indicates the following system frequencies at Fort Detrick trunk system: 385.7000 385.7750 387.3375 387.6750 MHz. Our reporter in the area also passed along two new frequencies at Fort Meade, Maryland: 380.3875 and 380.8375 MHz.

There is a new listing on Lindsay Blanton's *Radioreference.com* website of a new system in the Los Angeles, California, area. The system apparently consists of three sites:

Site 101 385.0125 385.2125 385.8875 386.1250  
 Site 102 386.1000  
 Site 103 386.0375 386.3375

I am looking for reports from *Milcom* monitors in the LA Basin area who may be able to shed some light on this new trunk system.

And that does it for this edition of *Milcom*. Until next month, 73 and good hunting.

## Flying High with Federal Communications

If you are limiting your federal monitoring to the VHF or UHF land mobile bands, you might consider spending some time listening to some of the air traffic control frequencies in your area. Many federal agencies operate aircraft as part of their missions. While most non-commercial airplanes use their FAA issued "N" number to identify themselves, planes operated by some agencies have special radio call signs that are used on the air traffic control frequencies as well as their own VHF or UHF radios.

Why do these agencies use these call signs? Some believe that it's to keep their true nature a secret, but more likely it is to alert the FAA controllers that they are dealing with an aircraft that may have special mission requirements or need priority handling. Many of the air missions of law enforcement agencies require the planes to be flying low or around in circles for extended periods, even near other air traffic. When the flight controllers hear the FLINT or ROSS call sign, they know what they are likely to be dealing with.

Here are a few of the known federal agency call signs you may hear when listening to air traffic control frequencies:

**AKRON** Reported to belong to the Bureau of Alcohol, Tobacco, and Firearms.

**BOISE** The BOISE flights are believed to be federal law enforcement operations, sometimes flown with Department of Defense aircraft. Many monitors have reported BOISE flights using Army Guard helicopters, possibly for surveillance or drug interdiction work. BOISE flights have been monitored arriving and departing many military fields, including

Fort Lewis, Washington.

**FLINT** Used by the Drug Enforcement Administration, FLINT aircraft numbers seem to be assigned to personnel rather than the aircraft. You will hear the FLINT pilots using the same call sign when talking on DEA frequencies.

**HOMELAND 1** Used by the Secretary of the Department of Homeland Security.

**IDAHO** Reported to be used by FBI aircraft, but may be used by other federal law enforcement agencies.

**INTERIOR US** Department of the Interior aircraft.

**JUSTICE** These are flights of the Justice Prisoner and Alien Transportation Service (JPATS) missions of the US Marshal's Service. Contract flights, such as Planet Airways and others, use the JUSTICE call sign when they are flying with prisoners aboard, but revert to the company name when flying empty. If you missed our mention of JPATS in the March edition of *Fed Files*, check out the JPATS web site, <http://www.usdoj.gov/marshals/jpats>.

**OMAHA** Used by the Bureau of Customs and Border Protection aircraft, OMAHA unit numbers seem to be assigned to the aircraft hardware and in some cases they seem to be derived from the airplane's FAA "N" registration number. The OMAHA flights can switch to a LIMA call sign when they are using the Customs radio nets. We'll talk more about Customs aircraft later in this column.

**ROSS** Federal Bureau of Investigation, this call sign is heard all over the country.

**SALEM** Bureau of Customs and Border Protection aircraft can use this call sign, as well as OMAHA, but I have not heard it used.

**ZEALUS** Coast Guard aircraft on law enforcement missions may use this call sign instead of COAST GUARD.

What about frequencies for these federal aircraft? Most of the time, you will hear these federal agencies using these call signs on normal VHF air traffic frequencies for the airports and flight paths around you between 118 MHz and 137 MHz. When not talking with the FAA flight controllers, these aircraft can be heard using their normal agency VHF or UHF communications frequencies, but they can also show up on some other air band frequencies. Here are some that you should keep an ear on, and remember that all these frequencies are in the AM mode:

### Freqs MHz

- 120.325 DHS Customs Air Operations
- 120.350 Justice Department (FBI)
- 120.375 Justice Department (FBI)
- 120.450 DHS Customs Air Operations
- 120.650 Justice Department
- 120.775 Justice Department - I've heard DEA FLINT aircraft using this one.
- 120.825 DHS Customs Air Operations
- 122.750 Department of Energy
- 122.800 A variety of government agencies have services on this frequency, also used as a UNICOM frequency.
- 122.850 US Forest Service, Army Corps of Engineers, Environmental Research Labs severe storms studies (backup frequency) and NASA.
- 122.900 National VHF search and rescue training frequency, also used by the Department of Agriculture, Bureau of Indian Affairs, Coast Guard, Environmental Research Labs severe storms studies, Environmental Protection Agency aircraft, US Forest Service, Department of Interior, National Park Service, NASA, NOAA.
- 122.925 Environmental Research Labs severe storms studies, NOAA.
- 122.975 US Forest Service
- 123.025 This is a nationwide helicopter multi-com frequency, so any federal agency using helicopters may show up here.
- 123.050 US Forest Service, NASA, NOAA
- 123.075 Also a nationwide helicopter multi-com frequency.
- 123.125 This is a favorite of the NASA T-38 aircraft flying all over the country, so keep this one in your scanner and you are sure to catch some NASA air-to-air chatter.
- 135.850 Federal Aviation Administration flight inspection
- 135.950 Federal Aviation Administration flight inspection
- 135.975 US Forest Service

### ❖ Coast Guard Aviation

Coast Guard aviation assets have become more important for not only emergency rescue and lifesaving operations, but also law enforcement and security. The US Coast Guard was included in the Department of Homeland Security



A Customs and Border Protection Cessna (CBP)

and along with Customs and Border Protection, now provides security and surveillance for our nation's ports and waterways.

As we reported in the March edition of the *Fed Files*, the Coast Guard is in the process of changing many of their aviation communications frequencies. The main Coast Guard UHF aviation frequencies have been changed starting in early 2005. The exact reasons for this change has not been officially defined, but most federal and military monitors believe that it is due to the wider use of the 380 MHz to 400 MHz band for military land-mobile use, specifically, new digital trunking systems. While these new systems are supposed to co-exist with aviation users in the band, it's possible that the Coast Guard simply wanted to avoid any possible conflict or interference problems in the future.

Here are the new nationwide Coast Guard UHF air operations frequencies, all in the AM mode:

345.0000 MHz – Air Primary  
237.9000 MHz – Air Secondary  
326.1500 MHz – Working Primary  
379.0500 MHz – Working Secondary

These new frequencies will replace the former USCG frequencies of 381.7, 381.8 and 383.9 MHz. Listeners report that the 345.0 MHz has become active all over the country.

The Coast Guard is also in the process of implementing a program they call "Rescue 21," which will provide a major upgrade to their communications systems nationwide. Improvements of the Coast Guard VHF marine communications sites as well as all the USCG VHF and UHF land mobile radio systems are planned. They will include moving to the new narrow-band requirements and allow interoperability with the APCO P-25 digital radios used by other DHS and DOD agencies. Here's the official web site of this new project, <http://www.uscg.mil/rescue21>. I'll have more information on the progress of Project 21 in future *Fed Files* columns..

## ❖ Customs Air Operations

The Customs and Border Protection bureau (CBP) of the Department of Homeland Security (DHS) operates a large number of aircraft, both fixed-wing and helicopters. The CBP air assets have started to take on a more significant role in protecting not only our national borders, but also airspace surveillance around large events and potential targets of terrorism. You can find information of some of their aircraft at the Customs and Border Protection web site, <http://www.cbp.gov/>.

Both the Presidential Inauguration and the Super Bowl in Jacksonville, Florida, were patrolled with Customs air assets. Listeners near Washington, DC during the week of the Inauguration reported OMAHA aircraft were involved in airborne patrols. During the Super Bowl in February, Customs aircraft were involved in controlling the airspace near the stadium.

In addition to the VHF air band frequencies listed above, CBP aircraft are often heard on UHF military frequencies as well. Their primary UHF frequency in most areas is 282.425 MHz (AM), still referred to as BLUE 1 by some Customs pilots. Often these pilots are communicating with HAMMER, the Customs Air and Marine Opera-

tions Center at March Joint Air Reserve Base in California.

HAMMER has numerous remote transmitter sites around that country that can reach the OMAHA flights anywhere they fly. If you don't have this frequency in one of your scanners, put it in now! You never know when it may become active in your area.

There have been many versions of the Customs aviation frequency lists circulating for years. I'm not sure how accurate my information is today, but here is one list of possible UHF frequencies for Customs aviation operations:

BLUE 1 – 282.425 MHz  
BLUE 2 – 303.825 MHz  
BLUE 3 – 336.600 MHz  
BLUE 4 – 254.200 MHz  
BLUE 5 – 234.600 MHz  
BLUE 7 – 238.400 MHz  
BLUE 8 – 387.800 MHz  
BLUE 9 – 361.800 MHz

For years, the BLUE 1 frequency has been very quiet up in the Pacific Northwest, but it has recently started to come alive with activity. I received some information from Matt Cawby up in the Seattle, Washington, area about some increased traffic by Customs aircraft in support of the CBP operations along the US - Canadian border: "I had Scanner Recorder on 282.425 MHz and got OMAHA 838 being vectored to a target north of Darrington, Washington, by call sign HAMMER. HAMMER advised that a UH-1 would be launching from Snohomish (I assume the Snohomish County helicopter), but I didn't hear them on 282.425. They lost radar contact near Arlington and 838 went back to Bellingham, Washington. ATC call sign was StationAir 60838, a Cessna 206." Thanks for that information, Matt!

## ❖ Checking in with the FAA

Your input to this column is critical and it's time to ask for some help in trying to answer some federal communications riddles. My question for the *Fed Files* readers is what has happened to the Federal Aviation Administration?

In past years the FAA's National Radio Communications Network, known as NARACS, was an interesting set of frequencies to monitor. You could often hear maintenance operations concerning the FAA's vast radar, data and voice communications systems. But about 5 years ago, all of the traffic I used to hear on the NARACS frequencies seemed to have disappeared – where did it go?

In 1995, contracts were awarded to upgrade the NARACS hardware, along with other FAA communications systems. But it appears the funding for the new narrow-band radio equipment may have been re-allocated to higher priority programs. Searching publicly available FAA documents on the Internet tells us very little of the current status of NARACS.

Some have suggested cell phones have taken over, which is a definite cause of a lot of federal radio traffic vanishing. But I'm still curious as to what has happened to the NARACS activity. Here is the original radio channel lineup for the FAA NARACS frequencies:

CH	Receive	Transmit
1	172.9250	169.3250
2	172.9500	169.3500
3	172.9750	169.3750
4	172.8500	169.2500
5	172.8750	169.2750
6	172.9000	169.3000
7	172.8250	169.2250
8	172.1250	172.1250
9	172.1500	172.1500
10	172.1750	172.1750
11	166.1750	166.1750

Since the formation of the Transportation Security Administration, the frequencies 172.9000 and 172.1500 have been given to them for nationwide use. In Portland, Oregon, the frequency of 166.1750 MHz recently became active with at the Portland International Airport, but it's unknown if the communications were FAA or another agency. The other NARACS channels remain curiously silent.

Are you are hearing activity on these FAA frequencies? If so, please let us know.

See you in July with another edition of *Fed Files*!

### Video Piracy

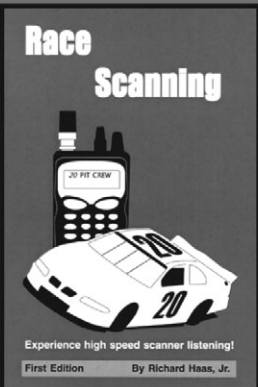
by David Lawson

This volume contains information about current security technology used by cable and satellite providers. This information is not available elsewhere.

**Video Piracy** has everything you need to know about video piracy. Satellite, Cable, Videotape, DVD, etc. ISBN 0-9703092-4-4 Only \$18.95. **Free info 954-610-2546**

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## Monitoring Transoceanic Flights

**H**ow do aircraft flying over the oceans communicate with land stations for Air Traffic Control purposes? Usable communications in the 118-136 MHz aircraft band only work at a fraction of the needed distances. Satellite services have attracted some business, but the bulk of communications still exist on the shortwave bands, since signals at these frequencies can travel thousands of miles – plus there is a very large base of already-installed HF radio equipment. Let's explore the communications we are able to receive, where they can be found, and how to understand them.

### Receivers First

A scanner will not receive these transmissions since they are mostly below 18 MHz and use single sideband (SSB) modulation. Hmmm, you don't have a shortwave / World Band / HF (high frequency) receiver? Well, maybe it's time to go shopping! When selecting a receiver, it is important to buy one that is known for its good SSB reception and it's helpful to have one with at least one hundred memories.

If your budget is in the \$500 range or more, an excellent receiver is the Icom R75. There are others, of course, but the R75 is a great value for the money. For information on the R75 or any other receiver, go to <http://www.google.com> and enter the make and model.



*The Icom R75 is a great receiver for monitoring transoceanic flights.*

### Where to Tune

#### MWARA Frequencies

The world is divided up into Major World Air Route Areas (MWARA). Each area has its set of HF frequencies for aircraft out of VHF range. Just as an example, the Central East Pacific CEP-1 area (off

the U.S./Canadian West Coast) uses the frequencies shown in the CEP-1 chart insert.

For the ARINC (Aeronautical Radio, Inc.) San Francisco (Pacific) and New York (Atlantic) frequencies, see: <http://www.faa.gov/ats/aat/ifim/ifim0109.htm> For worldwide MWARA frequencies, go to <http://www.flightradio.com/hf.htm> or to Google (link above) and enter "MWARA frequencies." You can try individual frequencies or you can simply tune around within the HF aero bands at different times of the day and night to see what pops up. See the "HF Aero Bands" chart insert.

HF Aero Frequency Bands in KHz USB	
2850-3155	8815-9040
3400-3500	10005-10100
4650-4750	11175-11400
5480-5730	13200-13360
6525-6765	15010-15100

#### ARINC

Aeronautical Radio, Inc. (ARINC) handles HF aeronautical radio traffic for a large part of the world. In their words, "ARINC's Air/Ground International Radio Service provides high-frequency (HF) single side band aeronautical operational control (AOC) voice communications for aircraft flying over the Atlantic, Caribbean, and Pacific oceans; Canadian and Arctic regions; and the Gulf of Mexico and Central and South America." ARINC operators relay information and requests back and forth between Air Traffic Controllers and the aircraft.

#### Propagation

HF propagation varies some during the day and considerably between night and day. The lower MWARA frequencies tend to be used more at night and higher ones during the day. The season, the point in the eleven-year sunspot cycle, and the current solar activity also affect HF propagation. Here is an informative, animated site on propagation: <http://www.ae4rv.com/tn/propflash.htm>. (Requires Macromedia Flash Player, with a link to a free download, if you need it).

#### Primary and Secondary

As you listen to the MWARA frequencies, you will hear the operator designate one frequency as "Primary" and another as "Secondary." Sometimes you will hear the term "Backup." If the aircraft cannot make contact on the Primary frequency, then attempts will be made on the Secondary or

Backup.

The Primary and Secondary frequencies for given routes and directions of travel vary throughout that day depending on propagation and frequency congestion. Try all the frequencies that you hear mentioned.

### Understanding What You Hear

#### SELCAL

The Selective Calling System (SELCAL) tones can be heard frequently on the MWARA frequencies. With SELCAL activated, the pilot will be alerted when there is a transmission for him (or her). He doesn't have to listen to the background noise or to radio traffic that doesn't pertain to him. As a listener, you will hear what sounds like two tones. Actually, each "tone" is a combination of two tones, so overall, there are four tones involved. The pilot tells the operator what four tones he requires. This is done by speaking four letters in the phonetic alphabet, such as Quebec Romeo Delta Sierra for QRDS.

Each SELCAL code is registered via ARINC. You can use these codes to identify the specific aircraft, the airline, the registration, and more. Please look at *SELCALs for the Enthusiast* at: <http://www.selcal.co.uk/>. The very helpful 1 MB ZIP file at "Database Download Page" expands to a 3 MB Microsoft Excel file that lists the registered SELCAL codes. (If you don't have Excel on your computer, a free Excel Viewer can be downloaded at: <http://www.microsoft.com/office/000/viewers.asp>).

#### Aircraft Type Codes

There are many types of aircraft. For brevity, each model is reduced to three digits using the International Air Transport Association (IATA) Code. The *SELCALs for the Enthusiast* database uses this code in their "Manucode" column. A "727" in the list means a "Boeing 727" (not a difficult guess). Other codes may not be as easily recognized. To the rescue is <http://www.airlinecodes.co.uk/acrtypes.htm> with most all of the codes.

#### Airline Company Codes

Passenger and cargo airline companies are represented by ICAO three-letter codes. They are used in various ways in the business and by hobbyists. Examples are: KAL for Korean Air Lines and QFA for Qantas Airways.

To decode the three-letter airline codes in the *SELCALs for the Enthusiast* database "OPCODE" column, and other places you find them, go to <http://www.faa.gov/ATPubs/CNT/3-3.htm> "Section 3 by 3-Letter Identifier" and select the first letter.

CEP-1 Frequencies in KHz USB	
3413	8843
3452	10057
5574	13354
6673	

## Call Signs and Registrations

Airliners identify by call sign and flight number. One can guess that "Alaska" is for Alaska Airlines. Listeners may know that "Speedbird" is British Airways. Many other call sign names are not so obvious or common. To decode the call sign and find the company name, go to "Section 2 by Telephony" at the above website and select the first letter of the call sign.

BizJets and private aircraft may identify with their aircraft registration number. Such numbers – gained from monitoring, from the *SELCALs for the Enthusiast* database, and from other sources – can lead to the Aircraft Description, Registered Owner, and more. For links to aircraft registration decodes worldwide, see: <http://www.lgw.org.uk/registers.htm>

## Reporting Points / Charts

Transoceanic aircraft follow defined routes, or tracks. Along these routes are "Reporting Points." You will hear them by name on the MWARA frequencies during "Position Reports." One route between Los Angeles and Hawaii, for example, has points DANKA, DEROK, DIALO, DOPPS, DONER, and DUETS along its way. Some routes also have points specified by latitude and longitude, such as 50N140W, 55N150W, 57N160W. Route Charts show the named Reporting Points and, of course, the Lat./Long. grids.

To learn about and/or obtain these useful charts, see <http://avn.faa.gov/index.asp?xml=naco/catalog> and click on "Supplemental Charts/Pubs," then explore the "North Pacific Route" and "North Atlantic Route" links.

You can also look up Reporting Points at <http://www.airnav.com/airspace/fix/> but spelling can be tricky. At AirNav.com, DIALO, for example reads, in part, "Location: 28-42-06.000N / 139-25-36.000W (OFFSHORE PACIFIC)." With a world globe in hand (another useful tool), you can find the approximate location of aircraft from the latitude and longitude. For a primer on latitude and longitude, see: <http://www.maptools.com/UsingLatLon/> and the links there.

## Position Reports

A position report on an oceanic flight track may go as follows – with the aircraft speaking first: "San Francisco, ALOHA 463, Position on 88." "ALOHA 463, San Francisco, Go ahead." "ALOHA 463, Position DIALO 2137, Flight Level 380, Estimate DEROK 2219, DANKA next, Fuel 21 decimal 2, Minus 42, Wind 280 diagonal 56, Smooth." "ALOHA 463, San Francisco, Roger, you have the Primary, the Secondary is 5574." "Secondary 5574, ALOHA 463." "San Francisco."

Here's some translation and links to more information: "San Francisco" is the ARINC station identification. "ALOHA 463" is the aircraft call sign / flight number. As above, the call sign ALOHA can

be looked up and yields Aloha Airlines. "Position on 88" is stating the intention to make a Position Report and letting the operator know on what frequency, in this case, 8843 kHz. "Position DIALO 2137" is the aircraft's current position at time 2137 in Coordinated Universal Time (UTC). (For info on UTC, see: <http://www.dxing.com/utcgmt.htm>).

"Flight Level 380" is an altitude of 38,000 feet. (For interesting info on Flight Level, see: [http://en.wikipedia.org/wiki/Flight\\_level](http://en.wikipedia.org/wiki/Flight_level) ). "Estimate DEROK 2219, DANKA next," is the estimated arrival time at DEROK with DANKA following that. On the North Pacific Route Chart – Northeast Area, one can see that the aircraft is half way between Los Angeles and Hawaii and from the sequence of reporting points, it shows the aircraft is Hawaii bound.

"Fuel 21 decimal 2" is 21,200 pounds of fuel on board. "Minus 42" is the outside air temperature in degrees Celsius. "Wind 280 diagonal 56" is the direction in degrees Magnetic North that the wind is coming from and at 56 knots – as if the plane had stopped momentarily to take the reading. "Smooth," in this case, is the observed quality of air turbulence.

## Following Aircraft

It is possible to follow a transoceanic aircraft on HF for hours on its track as it progresses through the reporting points. Helpful in this pursuit is <http://www.aeroseek.com/webtrax/>. Enter the airline and the flight number and it offers info on the flight and a map showing where it is.

If you live near a large coastal international airport and are following an inbound aircraft, you will eventually hear a handoff to an Air Route Traffic Control Center (ARTCC) controller on VHF when near the coast. It can then be followed through more frequency changes / handoffs – to Approach, Tower, and finally to Ground Control after landing.

For more info on handoffs and the different controllers' functions, see the *Monitoring Times* November 2004 issue – "Air Traffic Control for the Hobby Listener."

## SELCAL Checks

A SELCAL check might go like this: "San Francisco, Pacific 811 Heavy, Requests SELCAL check on Delta Hotel Mike Quebec" "Pacific 811 Heavy, Roger, here is the SELCAL Check, Standby, (then tones)" "San Francisco, Pacific 811 Heavy, SELCAL check confirmed, thank you." "San Francisco, Roger"

Translation: "Pacific 811," from the decode site mentioned above, is Air Pacific Limited based in Fiji. "Heavy," though not a term related to SELCALs, means the aircraft has a gross takeoff weight capability greater than 255,000 pounds (formerly 300,000). See <http://www.faa.gov/atpubs/PCG/A.HTM> and scroll to Aircraft Classes. "Heavy" is added onto the call signs of the planes over a certain size to warn controllers and other aircraft of the increased and dangerous wake turbulence. (For an interesting piece on wake turbulence, please see: <http://www.aopa.org/asf/asfarticles/sp9403.html> ).

From the *SELCALs for the Enthusiast* database, there are two aircraft with the code DHMQ. Duplications, though undesirable, do occur due to limited number of SELCAL codes.

From the list, the one with the operator code of "FJI" confirms it – the three-letter code for Air Pacific Limited. The aircraft is a "744" and when decoded, as described above, turns out to be a "Boeing 747-400 pax" – "pax" meaning a passenger model.

## SELCAL Decoders

You may hear SELCAL tones, but without the pilot or operator speaking the code each time, since the operator often already has the code. A listener still has a chance to obtain the SELCAL code, and thus the information it leads to, by using a SELCAL decoder. Here is an example: <http://www.airnavsystems.com/ANSD/>.

The decoder connects from the receiver to the computer sound card via an audio cable. Their info says, "After each SELCAL is decoded, information concerning the Flight will be shown, including aircraft type and company." They do say that the decode "success rate usually varies between 70 and 90%." (This column editor has no personal experience with a SELCAL decoder but the idea is certainly intriguing).

## Aircraft Photos

After monitoring a plane and identifying the airline or aircraft type, it can be fun to see some photos. Go to <http://www.airliners.net/> and click on "Take me to the Photo Search Page!" Using the Air Pacific example, select Air Pacific in the "Airline" search box. In the results, look for 747 photos. There are other searches. Explore them. Have fun!

See you next time.

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Information as of 2/17/2005 6:29:33 PM GMT	
FlightID: AAH481 (Commercial Jet)	
Status: IN FLIGHT	
Owner: ALOHA AIRLINES	
Radio Call: ALOHA	
Ground Spd: 426 kts	Altitude: 38,000
Type: B737 (Boeing Company Model 737-700)	
Origin Apt: SNA JOHN WAYNE AIRPORT-ORANGE COUNTY	
Dest Apt: HNL HONOLULU INTL	
Departed: 09:31 AM PST (1731Z)	
Original ETA: 01:29 PM HST (2329Z)	
Calculated ETA: 01:04 PM HST (2304Z)	In 4h 29m
Dist Fm Dept: 335 nm	Dist To Dest: 1907 nm

# More from the Mailbag

I am pleased to see the increased mail and loggings arriving at the *Below 500 kHz* desk. Mail typically runs a little higher at the close of the winter DX season, but this year has been far above normal. I can only conclude that interest in the band is alive and well, and that many new listeners are discovering what can be heard here. This month, we have a mix of historical information, DX loggings, and reader mail for you to enjoy.

Just a quick reminder that, when writing by e-mail, please include some LF-related text in the subject line, such as "Below 500 kHz" or "Longwave." In this way, I'll know your letter is not "spam" and it won't end up in the wrong bin.

## ❖ Longwave in the 1950s

We start this month off with a letter from Gene Mavretic (PA). Gene writes: "I just finished my Feb 2005 issue of *MT* magazine and your article regarding *500 kHz and Below*. Back in the mid-'50s I was a Navy Radioman (CW operator) assigned to Navy Radio Station Pt. Lyautey, French Morocco. We monitored 500 kHz during the quiet periods 24 hours a day. That was one of my duties besides guarding the Navy Air/Ground frequencies. Back in those days, Naval Patrol Aircraft (P2V Neptunes – sub hunters) used CW to maintain radio contact. I did copy a signal from a Soviet Naval Cruiser on 500 kHz advising us of a hazard to maritime navigation. Brings back a lot of good old memories of CW ops in the Navy. Everything was done via CW and 60-wpm RTTY."

Thanks, Gene. It's always nice to hear about these topics from someone "who was there." Your mention of 60-wpm RTTY reminded me of my foray into that activity as a new ham. In the late-1980s, I was probably one of the last operators still using a mechanical teleprinter (Model 15, I believe). I inherited it from another ham, and with a combination of grease, fine-tuning, and general good luck, I managed to get it on the air. I even had a perforator and transmitter-distributor (TD) unit, which could be used to cut and send paper "brag" tapes. PSK31 comes close to the thrill of those days, but I miss the sound (and shaking) of the old machine!

## ❖ Vintage Marine Band

Reader Perry Crabill, W3HQX (VA) offered additional insight into vintage users of the LF and MF marine band. He writes: "I used to listen to the Radio Compass Stations on 800 meters (375 kHz) when they were still active. A ship requesting

a bearing would send QTE? to establish contact, and would then send 'MO' in slow Morse code on 375 kHz for about a minute while the bearings were taken by the compass stations in the group involved. I can still hear that 'MO' in my mind when I think about it."

"Did I ever mention that I also used to listen to CW traffic on the Great Lakes on 410 kHz? That was the distress and calling frequency on that body of water until the service was replaced by radiotelephone operation on the Great Lakes, Ohio, and Mississippi Rivers. This was mostly on 2 MHz frequencies, although there were also 4 and 6 MHz assignments. I used to hear WMI, Lorain, Ohio, giving weather reports each morning."

Thanks, Perry. One of my earliest SWL memories was hearing a ship on the 2 MHz marine band calling a shore station in AM mode. Even then (mid 1970s) AM was nearly gone from the marine band, so I felt lucky to receive this signal. I was using an old Heath AR-2 receiver with a BFO that didn't work, so AM was about all I could hear. On the plus side, it allowed me to hear notable ham radio operators who used AM, such as the famous WA3PUN, and WA1HLR (both still licensed). I got quite a thrill when a QSL card arrived in the mail from WA3PUN. (No, I don't go back far enough to claim a card from the legendary W2OY, but I do have a recording of him – "CQ CQ CQ ... no kids, no lids, no space cadets"!)

## ❖ Australian Loggings

Kriss Larson (KG6UOS), recently vacationed in Australia, and brought his longwave gear along for use between sightseeing stops. He set up his gear in five different locations, but the best receiving site was at Ayers Rock, says Kriss, due to its central location and "total absence of any interference." According to Kriss, he simply didn't have the time to log everything he heard at Ayers Rock! Table 1 shows a selection of loggings from Kriss' trip. He notes that the VLF loggings (0-100 kHz) are speculative, based on record frequencies. Many of the beacons in Australia still contain voice weather broadcasts – a rarity in the U.S. today.

Finally, Kriss mentions that his longwave website has been upgraded with numerous maps and pictures, including the high-power beacon map of the U.S. that was featured in *MT*. You can access the site at:

<http://members.aol.com/trekkspl/Longwaveradio.html>

*Jacques d'Avignon (ON) submitted this QSL received from Algiers Radio on 153 kHz*



Table 1. Selected Australian Logs

Freq.	Call	Location	268	FRT	Forrest	352	PRL	Parkerville
16.4	JXN	Noviken Nor	269	CV	Charleville	353	LRE	Longreach
18	--	Russia?	272	LHI	Lord Howe	356	EN	Essendon
19.8	NWC	Exmouth Aus	272	PH	Perth	359	AMB	Amberley
20.5	--	China?	275	CWS	Cowes	359	NWA	Nowra
21.4	NPM	Lualualei, HI	276	TVL	Townsville	359	GEL	Geraldton
25	--	Russia?	281	DPO	Devonport	362	BOL	Bolinda
37.5	NRK	Iceland?	281	JT	Jandakot	364	CS	Cairns
40	JJY	Fukushima Jap	287	KG	Kalgoorlie	365	WLM	Williamtown
54	NDI	Okinawa Jap	293	CUN	Cunderdin	371	TRE	Taree
60	JJY	Fukuoka Jap	296	FLI	Flinders Is.	371	HUG	Hughenden
100	Loran	various loc.	302	BN	Brisbane	372	GIG	Gingin
Following entries are beacons...			302	WYY	Wynyard	374	TTR	Tea Tree
200	CKL	Clackline	305	GH	Griffith	377	EPP	Epping
206	BWX	Barrow Island	311	CH	Coffs Harbour	380	COR	Corowa
212	IFL	Innisfail	311	EDN	Edinburgh	383	WON	Wonthaggi
218	PLE	Plenty	317	GLS	Giles	386	BLN	Busselton
218	WBR	Warburton Range	317	RTI	Rottneest Is.	389	GFN	Grafton
224	RPY	Ripley	323	CAR	Carnarvon	389	YWE	Yarrowee
228	AYE	Ayers Rock	326	NHL	Nhill	395	PMQ	Port Macquarie
233	BLT	Ballarat	326	ESP	Esperance	396	LM	Learmonth
239	ABA	Albany	329	CVM	Caversham	398	MB	Moorabbin
240	LT	Launceston	332	CAS	Casino	404	KA	Karratha
242	BDG	Bendigo	332	BHI	Broken Hill	407	LTN	Laverton
245	SMI	Smithton	335	AS	Alice Springs	407	MRW	Morawa
248	WR	Woomera	338	ROC	Rockdale	413	SBG	Strathbogie
251	MEK	Meekatharra	340	PEA	Pearce	416	BK	Bankstown
260	NF	Norfolk Is.	344	DN	Darwin	416	MTI	Mornington Island
260	CKN	Cooktown	347	RIC	Richmond	419	PCK	Pt Cook
260	PD	Port Hedland	347	NSM	Norseman	428	GLF	Glenfield
266	SDM	Sydenham	350	ESL	East Sale	446	TNG	Thangool
			350	CIN	Curtin	486	LTV	Latrobe Valley

## FM Pirate Busts Continue

**A**s we often mention in this column, unlicensed pirate radio broadcasting is not authorized by the United States government. The Federal Communications Commission sometimes closes down pirate stations and levies fines against the station operators. Once again this month we have news of a variety of FM pirates who have been bagged by the FCC.

One bust last month was somewhat unusual. In Bossier City, LA, the FCC visited the pastor of a church who was broadcasting in Spanish on 88.3 MHz FM. He was advised to cease this by the FCC. In a more standard operation, the FCC visited and closed down **Dream Team Radio**, a hip hop pirate operating on 103.3 MHz in Naples, FL. Even the FCC pointed out during this bust that many dozens of pirates operate in southern Florida, which may be the FM pirate hotbed of the United States.

A debate continues between pirate radio advocates who support community-based stations like the two that were recently busted, and opponents of pirate radio that include the FCC and the National Association of Broadcasters. This debate has strong political overtones, and is not just a free radio issue. Many licensed stations are anxious to protect the economic value of their radio licenses. Many pirate advocates cite freedom of expression factors that they claim should justify expansion of radio outlets in the USA. Meanwhile, pirate radio operators transmit at their own risk, as has been true for many decades.

### ❖ Why 6925 kHz?

Another debate that has been ongoing for decades within pirate radio revolves around the frequency that pirates use for their North American pirate broadcasts. Some pirate radio advocates have long suggested that pirates should use a standard frequency, such as the current favorite of 6925 kHz. This maximizes the audience for pirate programming, since listeners know where to look for the transmissions, and they will be important parts of the audience for broadcasting. After all, some maintain, why transmit pirate programming if nobody is listening?

Another school of thought maintains that variable frequencies are a better strategy for shortwave pirate broadcasts. If frequencies are not known in advance, the stations make a much better DX target that is difficult to hear. This position maintains that much of the lure of pirate radio DXing relates to the skill needed to find and hear the broadcasts.

This month we have commentary from The Poet of **The Crystal Ship**. His station uses a variety of unusual and strange frequencies, but he sometimes also operates on the standard 6925 kHz frequency. He reports that he hopes to build an audience for his shows, even when he operates on an odd frequency such as 4071 kHz where few DXers are likely to look for him. He notes that he regularly tips off selected listeners in advance when he moves his transmitter to a strange part of the shortwave bands. He also notes that he enjoys being a difficult DX target, and that he takes pleasure when he gets a reception report from somewhere at a great distance from his transmitter location, especially when he uses an unusual frequency that is hard to find. He says, "For us (at The Crystal Ship) the two motivations of maximizing audience and being a DX target work hand in hand."

So, not everybody thinks that there are conflicting perspectives in this argument within pirate radio.

### ❖ Eritrea Quasi-Clandestine Address

Via DXplorer, Bruce Churchill reports receipt of a QSL that provides the address of the **Voice of the Broad Masses** in Eritrea. If you hear this one on 7100 kHz around 1500 UTC, the address that works for reception reports is Ministry of Information, Radio Department, Radio Engineering Division, PO Box 242, Asmara, Eritrea.

### ❖ What We Are Hearing

*Monitoring Times* readers heard 18 different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regular announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but the primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz remains the best place to scan for the pirates. More than 90% of all North American shortwave pirate broadcasts are heard on or near 6925 kHz.

**Ann Hoffer**- Rumors are circulating in the pirate community that this mysterious new station is a reincarnation of **Radio Free Ancaster**. (Uncertain; try Belfast)

**Channel Z**- This new one is puzzling so far. The announcer appears to be Sal Amoniac of Radio Three, but the shows are mostly rock music. (Belfast, or try

channelzradio@gmail.com e-mail)

**Grasscutter Radio**- Rock music and two-way pirate QSO conversations are still the staple format on this station. (Uses grasscutterrado@yahoo.com e-mail)

**Ground Zero Radio**- Dave Gunn's parodies nuclear war, if you can believe that. He also plays plenty of rock music and other comedy bits. (Elkhorn)

**Ironman Radio**- Scruffy Swab clearly has a new collector's series of QSLs, as we see here this month. (Belfast)

**Indira Calling**- Their parody of **All India Radio** normally includes east Indian tunes that were "requested" by pirate DXers. (Providence)

**KIPM**- The existential dramas on Alan Maxwell's station still provoke controversy. Some love the creative programming, while others hate the shows. (Elkhorn)

**Melvin Malfuction**- This one has returned with computer generated music and voices, a format you will not hear on licensed radio. (Uses melvinmalfuction@yahoo.com e-mail)

**Pirate Radio Boston**- Announcer Charlie Loudeno-boomer claims to be a reactivation of a station previously busted by the FCC. Alternative rock and pirate comedy are featured here. (Uses pirateradioboston@yahoo.com e-mail)

**Radio Azteca**- Bram Stoker has been producing a parody of himself with dozens of phony IDs including **Radio Gerbil** and other unlikely station names. (Belfast)

**Radio FCC**- A number of pirate stations have used this identification over the years. Rest assured that this one is not coming from the Federal Communications Commission. (None)

**The Crystal Ship**- The Poet's rock music sometimes is heard on 6925 kHz, but he sometimes broadcasts on other oddball frequencies such as 4071 and 6856 kHz as well. (Belfast and tcshortwave@yahoo.com e-mail)

**Voice of Captain Ron Shortwave**- Captain Ron normally programs heavy metal and punk rock music. (Uses captainronswr@yahoo.com e-mail)

**Voice of Laryngitis**- Pirate DXers have been delighted by the return of Genghis and Stanley Huxley, who produce one of the best classic pirate stations ever. (None, try Belfast)

**Voice of Pink Panther Radio**- Guess which movie theme is featured on this one? Yup, it is the Pink Panther. (Unsure)

**WHGW**- The format on this one is variable. It ranges from rock music to relays of old time radio shows. (Uses whgw6925@myway.com e-mail)

**WHYP**- The James Brownyard memorial station from North East, PA, is probably the most widely heard pirate radio station on the air today. (Providence)

**WSPY**- This mysterious station transmits a mix of spy numbers transmissions, telephone audio tones, and rock music. (None)

### QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the

IRONMAN RADIO



HEARD IRON ON JANUARY 22, 2005 ON 6.925 MHz IN USE. THE TIME WAVE 5.30-5.45 PM. THE OUTPUT WAVE 100 WATTS PER WATT. AMERICAN CUT DIPOLE ANTENNA. THANKS FOR LISTENING. Scruffy Swab

continued on page 61

# Waking the Dead, Unruding the Rude

**R**ecently I had the opportunity to drive through a region of the country I have not had reason to visit for about ten years or so. In looking over my logs I recalled the area to have quite a few fine and very active repeater systems. Consulting the current edition of the ARRL *Repeater Directory* revealed almost a dozen machines that should have made my stay in this area lots of fun for amateur radio. In preparation for the trip I programmed all the aforementioned systems into the memories of my handheld and looked forward to many hours of relaxing rag chewing.

What I discovered, however, did not speak well of the state of VHF/UHF repeater activity in 2005, at least in that particular part of the country. I shall keep the region nameless, because I know the situation to be similar in more than a few locations around the country.

As I drove through the area and set up shop in a number of bed & breakfasts and motels during my travels, I found incredibly little repeater activity. On many of the machines my calls went unanswered, even during peak *drive time* hours. (This does not bode well for travelers in need of aid in an unfamiliar part of the land.) Those machines where my call was answered almost always resulted in curt responses, sometimes with an overt indication that outsiders were not all that welcome. Roundtables consisted of a handful of friends talking only to one another and not opening up matters to general discussion.

I recall passing through this area in the past and being invited *twice* on two different repeaters to meet some local hams for coffee at local eateries. Now I find only dead air or the cold shoulder.

Something is not healthy in ham radio land. While most areas are not in as dire straits as the part of the world I was visiting, I think we can all think of one or two machines near our QTHs that are either unfriendly or have been so inactive that dust comes out of the speaker when you key them up.

### ❖ What Happened?

I guess we could begin the analysis by looking at how the area might have started down the road to radio hobby entropy. The most common excuse I hear folks give is, "The Internet is to blame!"

I suppose by some stretch of the imagination an argument could be made that some folks have stopped playing radio in favor of playing with computers. My experience, and

that of most of my friends, does not reflect that scenario. I cannot think of any ham who has become inactive due to the addition of a computer in the shack. Every radio person I know – ham or otherwise – has seen the computer as a tool to enhance their hobby fun. While computer technology is a convenient target, I just don't see anything that really supports this notion. Have you ever seen an ad in the ham radio press stating "Must sell my ham gear to buy a PC?" Nope, me either.

A more reasonable argument might be made for the growth of the cellular phone industry cutting into ham repeater activity. Many repeaters sprang up around the use of, and access to, a viable area telephone patch system. I know more than a few folks (whose ham activity is mainly in the HF bands), who bought a 2 meter rig and supported a local repeater just for the security of being able to make an emergency call from the road. Today, for most folks, cell phones do the job instead. So, the lack of need for phone-patch based systems and their group support brings us to where the problem probably really comes home to roost.

I think we have nobody but ourselves to blame for the lack of repeater activity. Most metropolitan areas (with the reduction in phone patch use) probably have more repeater systems than they reasonably require. In the late seventies and early eighties, everyone who could get a channel off of their regional frequency coordinator (and even some who didn't) put a repeater system on the air. So, instead of a large number of folks sharing the fun in a few good places, smaller and smaller groups broke out onto the different machines and, over time, there just wasn't enough activity to keep folks interested. And, with fewer folks depending on phone patching to let their significant other know when they would be home for dinner, a lot of machines have gotten awfully quiet. Quantity is seldom quality.

### ❖ No Ham is an Island

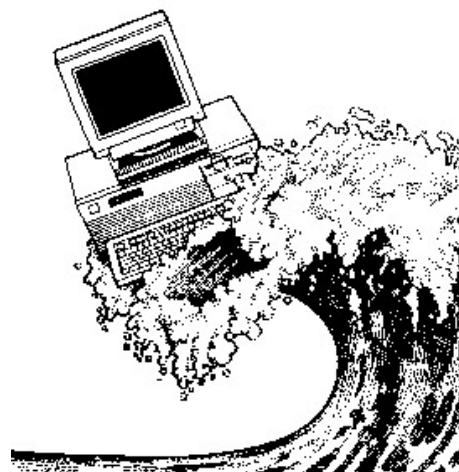
So, we have addressed the dead systems: What about those unfriendly ones? That might be a tougher nut to crack, but it's something we need to look at, because, along with a drop in repeater system use, has come a drop in the interest in emergency service activity. In spite of efforts to tighten up emergency response for increased homeland security, many local groups still find it hard to get folks out for ARES/RACES nets and field activities. Sadly, even some of those groups that are active can

tend to be rather insular. While they may pay lip service to the desire for new participants, their actions and attitudes treat newcomers like outsiders.

This is actually a fairly complicated subject that goes well beyond the ham radio world. An excellent book that looks at the problem and some of the solutions is called *Bowling Alone: The Collapse and Revival of American Community* by Robert D. Putnam (New York: Simon & Schuster, 2000). I commend it to you for further study.

Some systems that were once open, with gregarious memberships who encouraged new activity, have turned in on themselves, feeling little or no connection with hams outside of the local group. I once drove through an area and made a call on a system listed in the ARRL *Repeater Directory* as "open." Before the squelch tail dropped, someone (who, by the way, neglected to give his callsign), felt the need to inform me in no uncertain terms that people who did not pay dues on the system were not allowed to talk on it. Even if this was a case where the system had gone "closed" for some reason (it hadn't), I am sure you can think of quite a few ways that interaction could have been handled with better amateur radio spirit and camaraderie!

So how do we get these inactive and insular repeater systems to wake up and operate in the best traditions of the amateur radio fraternity? In checking out matters with some of my local repeater groups and talking with folks in other parts of the country, I think there are lots of ways



*Contrary to popular belief, the wave of interest in personal computing did not kill off repeater use.*

to turn dead and unfriendly systems around. Let me outline a few that might be useful should you run into similar situations in your area.

## ❖ Join Your Local Repeater Group

Regardless whether a system is considered open or closed, the people who pay the bills always have the most say in how a system is run. Contributing membership in your local system(s) allows you to have input into matters, or at least have direct access to those who set policy.

Remember that system I spoke of where I was told to get off the air because I wasn't a paying member? I made a point of finding out who the system trustee was and getting in contact with him. That gentleman assured me that this unknown individual was not speaking for the repeater group, that the system was open and use by travelers was encouraged. He assured me that the matter would be discussed at the next quarterly repeater group meeting and that he would advise regular users to keep an ear out for anyone making such inappropriate statements on behalf of the group.

I wasn't a member of that group and my concerns were still well heard. Think of how much more clout a ham's position would have if he was a card carrying member!

## ❖ Go to Group Meetings

This is sort of a chicken and egg situation. I know of some repeater groups that, as they have become more inactive, have held less frequent meetings. This is 180 degrees out of phase. You need to hold *more frequent* meetings to discuss how to improve system participation, to meet and welcome new hams to the group, and to find out about any emerging matters that could have a negative effect on the system. More meetings will produce more activity. A more active repeater will have more members, who will come to more meetings... Get the picture?

And while you're at those meetings, be a voice for the kind of repeater group you would want to be a member of. Remind folks of the public service aspects of the hobby as well as the brotherhood and sisterhood all hams should show for each other.

## ❖ Lead by Example

As a bona fide member of your local system, make a point of getting on the air frequently and taking the time to greet and reach out to newcomers and travelers you hear on the system. Often, these folks will be amateurs just starting out in their ham radio experience. Not only can you help them to feel welcome, you can help them to learn correct practice and procedures and make them a better ham in doing so.

Since the general demise of the Novice Bands, newcomers have no safe place to cut their amateur radio teeth. New folks need support and encouragement. A little effort on your part will go a long way and probably even bring in a new member to your local group. You may even make a friend for life.

## ❖ Consider System Consolidation

This can be a touchy subject, because some folks have a lot of sweat equity as well as personal finances tied up in building and maintaining their particular systems. But what good is it to have a bunch of systems with nobody to talk to? In areas where the need for multiple systems has fallen off for the reasons mentioned above, repeater groups need to reach out to one another for their mutual survival. Most areas of our country could be better served if repeater groups would begin to look at consolidation seriously and reasonably.

## ❖ On Air Activities

It's easy to encourage repeater system use through organized activities. How about a weekly swap net? Code practice? Technical discussion? Encourage taking turns moderating the activities to get more people involved.

Here's a great activity that allows for participation by retirees and shut ins: Set up a schedule for repeater monitoring so that as many hours as possible of the day or night are covered by someone from the group. It's easy enough to do: just get folks to sign up for an hour or two where they promise to keep their rig on and answer any call that comes in. Even if you can't get 24/7 coverage, try to see that your machine is covered during peak commuter hours and on weekends. What a great service to travelers and newcomers!

No repeater has to fall into disuse or, worse yet, rudeness. With a little effort and some reflection on what makes the amateur radio hobby great, any repeater can become a popular place that performs good service and is fun to hang around.

I'll see you on the bottom end of 40 meters – that is, unless you answer my call on your local machine!

### UNCLE SKIP'S CONTEST CALENDAR

**AGCW QRP/QRP Party**  
May 1 1300 - 1900 UTC

**MARAC County Hunter Contest (CW)**  
May 7 0000 UTC - May 8 2400 UTC

**Nevada QSO Party**  
May 7 0000 UTC - May 8 0600 UTC

**10-10 Int. Spring Contest (CW)**  
May 7 0001 UTC - May 8 2400 UTC

**Microwave Spring Sprint**  
May 7 0600 - 1300 Local Time

**Oregon QSO Party**  
May 7 1400 UTC - May 8 0200 UTC

**Indiana QSO Party**  
May 7 1600 UTC - May 8 0400 UTC

**New England QSO Party**  
May 7 2000 UTC - May 8 0500 UTC

**May 8 1300 - 2400 UTC**

**Mid-Atlantic QSO Party**  
May 14 1600 UTC - May 15 0400 UTC

**May 15 1100 - 2400 UTC**

**FISTS Spring Sprint**  
May 14 1700 UTC - 2100 UTC

**50 MHz Spring Sprint**  
May 14 2300 UTC - May 15 0300 UTC

**CQ WW WPX Contest (CW)**  
May 28 0000 UTC - May 29 2359 UTC

**QRP/ARCI Hootowl Sprint**  
May 29 2000 UTC - 2400 UTC

**MI QRP Memorial Day CW Sprint**  
May 29 2300 UTC - May 30 0300 UTC

## Outer Limits continued from Page 59

value of the US dollar is plunging rapidly. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 69, Elkhorn, NE 68022; PO Box 28413, Providence, RI 02908; and PO Box 293, Merlin, Ontario NOP 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, free to contributors via [niel@jcan.net](mailto:niel@jcan.net). The Free Radio Network web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net>, and a few pirates will occasionally QSL a web site report left on the FRN.

## Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Artie Bigley, Columbus, OH; Jerry Berg, Lexington, MA; Bruce Churchill, Falbrook, CA; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Wimberly, TX; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Dan Malloy, Everett, MA; Mark Morgan, Cincinnati, OH; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Bryan Smith, Bethlehem, PA; Niel Wolfish, Toronto, Ontario, and Joe Wood, Greenback, TN.

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✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz. \$13.95 postpaid

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## Antenna Types: Antennas with Reflectors

**A**s we discussed in the first column in this series, around 1887 Heinrich Hertz demonstrated the existence of electromagnetic (EM) waves. Although it was once popular to call these waves “Hertzian waves,” today we often call them “radio waves.” And, remarkably, in his early work Hertz developed several antenna designs which utilized the basic features found in the majority of antennas in use today! This month we will consider antennas which utilize reflectors. And, yes, Hertz developed the first antenna to utilize a reflector in its design.

### ❖ The Use of Reflectors with Antennas

A receiving antenna element which is fed current from a transmitter or which captures received signals and feeds them to a feed line or receiver, is sometimes called the “driven element.” A driven element can capture a portion of a signal which propagates to its location. In many antenna designs an element called a “reflector” is also used. The reflector’s purpose is to capture some of the incoming signal’s energy which was not captured by the driven element, and reflect some of that energy to the driven element. In well-designed antennas the use of a reflector can give a useful increase in the level of received-signal strength.

This increase in signal strength, or “gain” as it is called, is usually a welcome factor. However, its contribution to the quality of reception is often overshadowed by the directivity that

results from antenna designs which utilize reflectors. This is due to the fact that a directional pattern is frequently quite useful in reducing the strength of received noise and other interference. This can occur in two different ways.

One way is that the overall reception pattern for a directional antenna diminishes reception from most directions except for its favored directions. Thus, interference is reduced if it doesn’t arrive from the directions favored by the directional antenna. Due to the prevalence of received noise and other interference at HF and lower frequencies, this kind of interference reduction is quite important on these bands.

The second useful feature of directional antennas is that the strength of received interference from one specific direction can often be dramatically reduced. This is accomplished by orienting the antenna such that a deep null, or direction of minimal response, in the antenna’s pattern is pointing in the direction of the received interference.

At VHF and higher in frequency, received noise and interference are much less prevalent, and at these frequencies the primary value of a directional antenna is more likely to be its ability to deliver a higher level of received signal than that available from a non-directional, lower-gain antenna.

### ❖ Non-Resonant Reflecting Surfaces

Today, the most common reflecting surfaces for antennas are configured as: flat, V or

corner-shaped, trough-shaped, and “dishes” with a parabolic or spherical-section shape. In his work, Hertz utilized a parabolically-curved sheet of conductive metal as his reflector (fig. 1A). A Hertzian dipole was placed on the focal line to which the energy reflected from the parabolic surface. This added energy gave the antenna an increase in received-signal strength over what it captured without the reflector.

Many of today’s antennas utilize a dish reflector whose surface is shaped as a parabola revolved around its axis (fig. 1B). This surface focuses the EM energy back to a focal point rather than the focal line of Hertz’s original cylindrical-parabolic reflector. Today, various kinds of driven elements – including but not limited to Hertzian dipoles – are used as the focal point receiving element for dish antennas.

### ❖ Resonant Wire Reflectors

Wires as reflectors? I’ve got to be joking, right? Well, let’s see. To be effective, the surface reflectors discussed above must be at least a minimum size in relation to their wavelength; however, such reflectors aren’t actually tuned to a specific frequency. But let’s now consider the idea of reflectors that are *tuned*.

When an antenna element receives energy from a passing EM wave, the current induced by that wave flows in the antenna. If a load, such as a transmission line leading to a receiver, is attached to the element, then some, but not all of the induced current will flow from the antenna to the load. Also, the energy from a portion of the received current will be re-radiated, just as EM energy is radiated when current flows in a transmitting antenna.

For an element with no load there is no route for current to flow from the antenna, and so more current remains available for re-radiation as EM waves. When a half-wavelength dipole with no load attached is spaced appropriately behind a driven element, then a portion of the energy re-radiated (reflected) from that dipole will be directed to the driven element (fig. 1C). This reflected energy increases the level of received signal flowing in the driven element. Thus, the antenna’s gain is increased.

The Yagi-Uda beam is an example of one antenna which depends on a tuned-reflector element for its gain and directivity. We might note here also that half wavelength dipoles placed at an appropriate spacing ahead of the driven element can be designed to serve as directors (fig. 1C) somewhat as a magnifying lens can focus light.

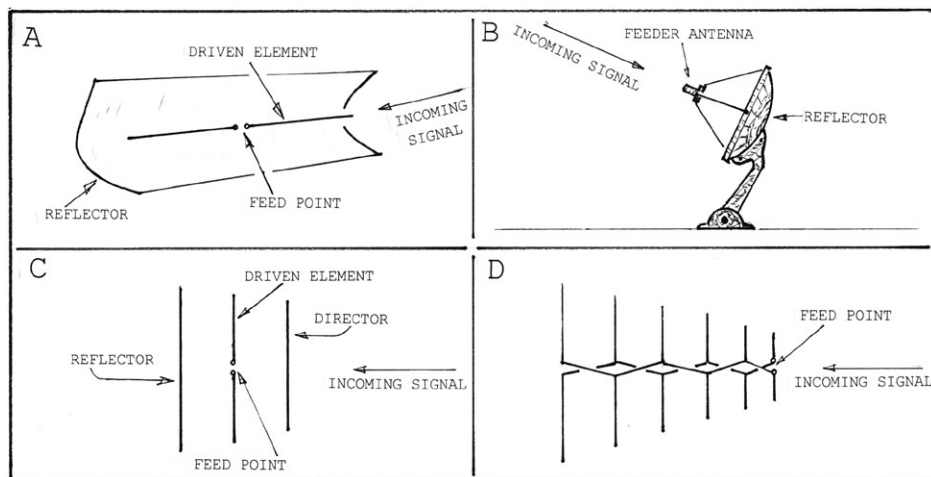


Fig. 1. Cylindrical, paraboloid-reflector antenna (A), Parabolic-shaped, dish-reflector antenna (B), Yagi-Uda, beam antenna (C), LPDA antenna (D).

#### This Month's Interesting Antenna-Related Web site:

How to make a parabolic reflector antenna for your wireless WiFi internet connection:

<http://www.freeantennas.com/prod01.htm>

A discussion of parabolic dish antennas:

[http://www.radio-electronics.com/info/antennas/parabolic/parabolic\\_reflector.php](http://www.radio-electronics.com/info/antennas/parabolic/parabolic_reflector.php)

Calculating dimensions for parabolic-reflector antennas:

<http://www.csgnetwork.com/antennaparaboliccalc.html>

A tutorial on antennas:

<http://www.electronics-tutorials.com/antennas/antenna-basics.htm>

A test of antenna knowledge; this site is intended as preparation for the FCC GMDSS license:

<http://members.aol.com/ab0di/el3c8.html>

Note that in the Yagi-Uda antenna (fig. 1C), the driven element, the reflecting elements, and the directing elements are all essentially Hertzian dipoles. Beam antennas frequently have more than one director, but usually only one reflector.

The log-periodic dipole array (LPDA) (fig. D) is a popular, wideband, beam antenna design. Basically, it is an array of Hertzian dipoles arranged such that, at any one frequency, the length of only a few of its many elements are close to resonance. These few elements

are adjacent to one another, and together they function as a directional antenna. This antenna is designed with an array of elements of progressively differing lengths, and can be made to cover a very wide band of frequencies. LPDAs are very useful where frequency of operation is frequently changed.

#### ❖ Some Other Antennas with Reflectors

Reflectors are also utilized with many other antenna designs including the axial-mode helix (flat reflectors), the cubical-quad beam (tuned-loop reflectors), and others. Incidentally, the elements of the cubical-quad beam were developed by opening out the "squashed" or folded loop which constitutes the folded-dipole antenna. And yes, the folded dipole was derived from the Hertzian dipole.

producing highly-useful, practical-sized antennas. This was true even at wavelengths as long as those of the HF band. Does this antenna, discovered so long after Hertz's original work, owe any debt at all to any of Hertz's antennas?" As is obvious from the above discussion, the answer is "yes."

#### This Month:

The above discussion has been concerned with antennas receiving signals. Can the antennas discussed be used for transmitting as well? And if they can, will they have the same increased gain and directional performance for transmitting as they do for reception?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

## RADIO RIDDLES

#### Last Month:

I asked: "The discovery of the principles of the Yagi-Uda beam antenna excited workers in radio technology. Its potential for high gain levels and sharp radiation-reception patterns gave antenna designers a much needed tool for

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## Digging into the Signal Tracers

This is a subject I kind of backed into. Since I had a little extra room last month, I jumped into the topic before I had really intended to. So you already know that we'll be working with two models of signal tracer – the Heathkit IT-12 and the Eico 147-A – that are representative of the many variants you will see at antique radio meets and hamfests. And you've already had an overview of how these instruments can be used to troubleshoot problems in radio receivers.

This month we'll begin by taking a look at the circuitry of these helpful servicing devices. I'll use the schematic of the 147-A as an example. The IT-12 circuit is very similar; I'll explain the few differences later.

Basically, the 147-A is a high-gain, three-stage audio amplifier. The first two stages (V1A and V1B) are the two halves of a 12AX7 dual triode; the third stage (V2) is a 6AQ5 pentode. The level of the signal passing through the amplifier can be monitored by a 1629 magic eye tube (V4) connected to the grid of V3. If more precise comparative measurements of gain are required, a VTVM or scope can be connected to a jack (J10) provided for the purpose.

The output of V3 is connected, via output transformer T1, to loudspeaker SP1. Thus, the signal passing through the amplifier can be monitored aurally.



Front panel view of the Eico signal tracer shows the jacks and controls that give this instrument its great flexibility.

Thanks to a handy arrangement of jacks and switches, this audio amplifier circuit can be used as a utility amplifier for testing phonos, tape decks, etc.; to follow a signal through a radio receiver under test (as explained last month); or to substitute for various parts of a receiver thought to be defective.

### ❖ Output Switching in the 147-A

Just for the heck of it, let's start at the end of the signal path and look at the amplifier's output stage. This is controlled by a four-position

switch (S2A and S2B) labeled AC OFF/TEST OUT. XFMR, TRACE, TEST AMPL./TEST SPKR, and WATTMETER. With the switch in TRACE position, signals pass through the unit as in a normal audio amplifier and are heard in the loudspeaker.

Now suppose you want to use the instrument as a test speaker. The speaker is available at jacks J7 and J8. To use it independently of the amplifier, move the switch to the TEST AMPL./TEST SPKR position, which disconnects the speaker from the built-in output transformer.

This switch

position also disconnects the top of the output transformer secondary from the speaker and makes it available at jack J9.

Thus, the output of the amplifier is now available, minus the speaker, between jacks J9 and ground (J8). Now the unit

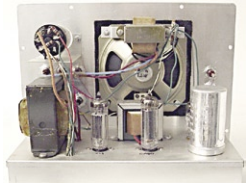
can be used as a test amplifier. With an appropriate input signal, the output could be fed (for example) into a suspect speaker to check its sound reproduction.

The switch marked AC OFF/TEST OUT. XFMR, is the on-off switch for the unit. In this position, the 147-A is shut off, which removes B-plus from the primary of the output transformer, making it safe to connect to a radio in place of an output transformer suspected of being defective. For a radio with a single-ended output, use jacks J4 and J5. But note that the transformer is center-tapped so that it can be used for radios with push-pull outputs. In such cases, use jacks J4, J5 and J6.

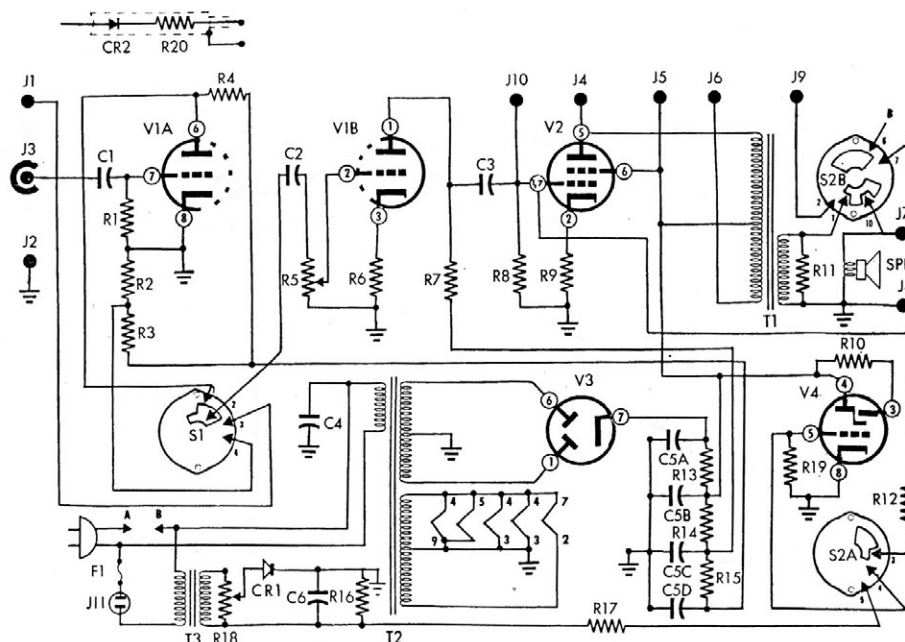
In the WATTMETER position, the eye tube is connected so that it can be used to find the power drain of a receiver plugged into the front panel of the signal tracer. Some people find that this is a useful diagnostic tool. We'll give it a try later.

### ❖ Input Circuitry

So now let's take a look at how to inject an r.f. test signal into the input of the 147A. An Amphenol-style mic connector on the front panel (J3), labeled RF INPUT, is wired to the grid of the first stage (V1A) via d.c. blocking capacitor C1. This connector accepts the output of a demodulator test probe.



The Eico designers weren't exactly trying to conserve space when laying out the chassis of the 147A.



Schematic diagram of the Eico 147A. See text for details.

I didn't receive the probe with the instrument (as is often the case with instrumentation purchased at flea markets) and will have to construct one. For the hookup of this probe, look just above V1A on the schematic. Note that it includes CR2, a 1N48 rectifier diode, to demodulate, or extract, the audio component of the r.f. signal from the radio under test.

With the input switch set at RF, the grid of V1B is connected to the plate of V1A via gain control R5 and blocking capacitor C2. The audio picked up at J3 is thus amplified by all three stages of the instrument and can be heard in the built-in speaker (if the output switch is set to TRACE). At the same time, its level can be estimated by the indication on the eye tube.

For evaluating an audio signal after it has been demodulated within the receiver under test (sampled at any point after the detector stage), a set of ordinary test leads is plugged into the AUDIO INPUT jacks (J1 and J2) and the input switch is set to AUDIO. With the switch in that position, blocking capacitor C2 is disconnected from the plate of V1A and connected to jack J1.

The reason for bypassing V1A in this way is that the demodulated audio signal does need as much amplification as the r.f. signal produced by earlier stages of the receiver. As before, the audio signal can be heard in the built-in speaker (if the output switch is set to TRACE) and its level can be estimated by the indication on the eye tube.

The input switch has a third position, NOISE. This activates a very useful function that will help isolate faulty components, cold solder joints, and other intermittent connections. With the switch in the NOISE position, approximately 130 volts of d.c. is applied to the AUDIO INPUT jack (J1). With the probe from jack J2 grounded to the chassis of the radio under test (which is unplugged for this procedure), the probe from J1 is touched to the suspected circuit point of the radio.

The d.c. on J1 will trigger otherwise intermittent noise that might be generated by a defective component or poor connection. Any noise picked up at the J1 probe will be amplified and heard in the speaker. If only a single sharp click is heard, then there is probably no noise source between the circuit point and the B plus line.

However, if a frying, hissing, or similar sound is heard, you have a noise problem to be investigated. Keep moving the probe, connection by connection, closer to the B plus line. When the noise stops, you have just passed the defective component or connection.

## ❖ How the IT-12 Compares

The Heathkit IT-12 Signal Tracer is built for compactness. It is an inch shorter and less than half the width of the Eico 147-A. Though, electronically, it is practically a clone of the Eico, its compactness is achieved by careful attention to physical design, the use of a much smaller speaker and elimination of some features. Through simplifying the switching circuits, a couple of miniature slide switches do the job of the rotary switches in the 147A.

Since my space is at a premium, I won't show the schematic of the IT-12. However, it is easy to describe the few ways in which it differs from the 147A. Both units are transformer-powered, but the IT-12's power supply uses a half-wave silicon rectifier instead of the full-wave vacuum tube rectifier in the 147A—and it is engineered to run on a much smaller plate voltage (130 VS 270-300). There is no wattmeter function.

The IT-12 is also minus the VTVM/scope jack that is available on the 147-A. And though jacks and switching are provided so that the internal speaker can be used as a test speaker, there is no provision for use of the IT-12 to be used, minus its speaker, as a test amplifier.

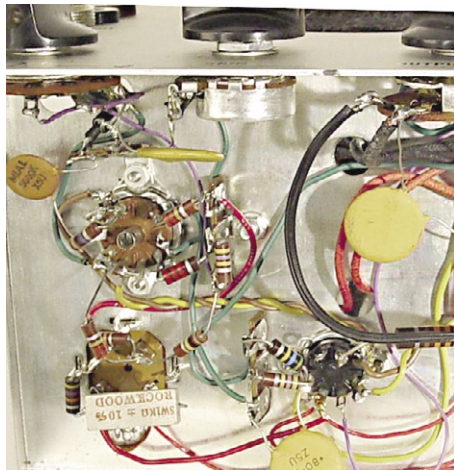
The output transformer, however, can be broken out of the circuit for use in substitution. And, as in the 147-A, it is center-tapped so that it can be used both with single- and double-ended receiver outputs. The IT-12 also has a noise test feature similar to that in the 147A.

As far as the input circuits are concerned, the instrument has only one probe connection instead of the two on the 147-A. A dual-purpose probe is used. It has a slide switch that cuts out the demodulator circuit used for r.f. when a "straight-through" probe for audio use is needed.

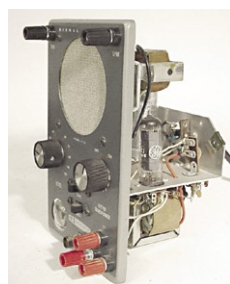
There is no provision for bypassing the first stage of amplification for audio testing. The level control is relied upon to reduce the audio gain so the amplifier won't "choke" on the signal.

## ❖ Looking inside the Instruments

When I opened up the cases of the two instruments, I realized that I would have little or



*Under-chassis view of the Eico unit shows careful construction of the original kit builder. Note use of ceramic rather than paper capacitors.*



*A smaller speaker, careful mechanical design and concentration on basic features gives the Heath IT-12 a very diminutive footprint.*

no restoration work to do. That is mainly because neither unit contained the paper capacitors that I always change out wholesale and on sight. Instead, both use the much more reliable disc ceramics.

Both units were much newer than any equipment worked on previously in this column (the IT-12 had a scratched-on 1972 date inside its case). They were very clean and seem to have suffered little from the ravages of time. Of course, being Eico and Heath units, both were kit-built. But both had been built meticulously by owners who obviously really cared about doing a good job.

After checking all tubes and treating switches and pots with contact cleaner, I decided to power the units up. However, because both instruments still had their original power-supply electrolytics, I couldn't just plug in and switch on. Electrolytic capacitors that have been long disused need to be "reformed"—that, is powered-up slowly to give their chemical insulation layers a chance to build up again.

I have a little tapped-primary isolation transformer that I use for this. It produces secondary voltages of 70, 90 and 110. I used it to start up each of my two signal tracers, lingering for awhile on each tap while monitoring B plus to make sure that voltage was rising appropriately. Finally, I plugged each unit directly into the a.c. line. Both instruments responded very well, their eye tubes glowing brightly under full voltage.

See you next time, when we'll try out both instruments.

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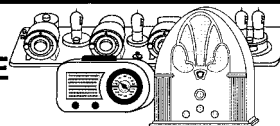
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## “Bugs” 2 “Boards”

By Carl Herbert AA2JZ

*Prior to the advent of circuit boards, products were hand wired and soldered. Circuit boards were the answer to lowering labor costs on the assembly line, and they work well for amateurs, too. Here's a project that will be an addition to your shop that won't cost a fortune and is easy to build.*

Imitating the clean appearance of commercially manufactured radios is the goal of many builders. Building amateur radio “gear” has always been a great source of enjoyment for me. Creating equipment, whether of your own design or another's, can be a very rewarding experience. Sure, it may require gaining some new knowledge, but we are capable of learning more, I'm sure. I've yet to meet the builder who could resist assembling more gear.

Contrary to what you might think, circuit boards, with their gleaming copper lines etched to carry signals from place to place, aren't extremely difficult to create. There is more than one method of creating the circuit from a copper-coated board, but the most common involves exposing the board, covered by a negative image of your circuit, to ultraviolet light.

### WARNING

**Exposure to ultraviolet light can be harmful to your eyes and skin.**

The manufacturer of the tube I used claimed “proprietary information” when I requested technical information about the wavelength of the ultraviolet light created. Treat the source as a potentially harmful ultraviolet source to be safe.

Wanting to have the capability to make my own circuit boards using this method, I read many articles about the process. One article, in which the author used a “germicidal” fluorescent tube for exposure, particularly interested me. This type of tube was available, but the cost was beyond what I wanted to spend. Another article told of using the fluorescent tube from a “bug zapper” for the same purpose! (It seems that insects have the capability to see ultraviolet light.) Now *that* appeared to be an easy answer to the problem!

### ❖ Shopping for Parts

At a local garage sale, I found a used “zapper” for a couple of dollars. The seller plugged it in for me to prove that it still worked, and I was off to my shop to begin the building process.

Disassembling the unit wasn't much of a chore. There were a few screws holding the exterior decorative work and four more holding the metal base plate to the top housing on the inside. I carefully cleaned the tube and its mounting plate containing a transformer, and put them away for safe storage. The tube measures 12 inches overall; therefore, I would need a suitable metal box for the project.

The enclosure I used was a “hamfest” find for a dollar, and it measures 12”W x 9”H x 10”D. Its original purpose in life was a housing for data networking devices. The rear panel was filled with holes for cable connections, and the top and bottom were perforated for ventilation. The first requirement then was to line the interior of the box with aluminum flashing. This will protect the operator (me!) from exposure to UV, and direct the UV towards the board to be exposed.

Now for the second problem – the length of the tube is almost exactly the same as the interior measurement of the box! This problem was easily solved by cutting a hole in the side of the box for the socket and wiring. Photograph A shows the location of the electrical end of the tube.

After some careful thought, the metal mounting plate for the tube was cut to about 3” by 4”, with the mounting hole for the tube socket in the middle. By so doing, I wouldn't be

required to create another mounting hole for the socket. (See Drawing A)

The rear surface of a single gang *solid* electrical box was drilled out to match the hole in the side of the box for the tube socket and wiring. *Don't overcut the hole in the box.* Make it large enough to allow the socket to clear the side metal of the box, but not so large as to be bigger than the rear surface of the electrical box.

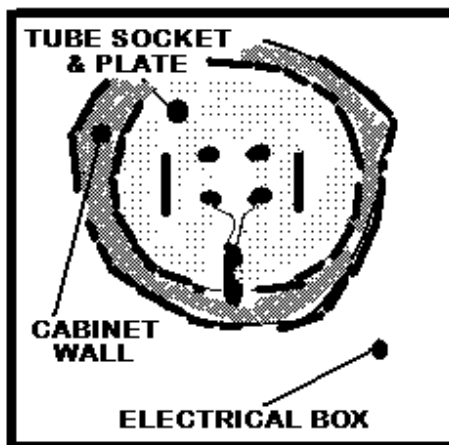
Don't forget to keep the *mounting holes* for the electrical box intact, or you'll be drilling new ones. I mounted the socket and plate to the interior of the box using the same screws and nuts for mounting the electrical box.

Be careful not to damage the wiring for the neon device attached to the socket. It is needed for the operation of the unit. The leads on my unit were welded to the socket – breaking them would have been a disaster!

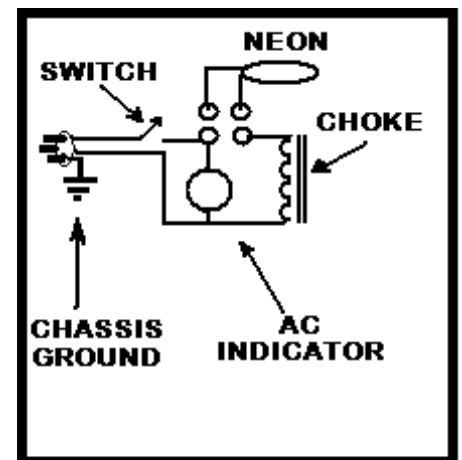
The choke (transformer) found its place in the rear uppermost corner of the box. Wiring from the choke to the electrical box is via another small hole adjacent to the socket. I used a rubber grommet to protect the choke wiring from the sharp metal edges of the cabinet and electrical box.

Photograph A also has “wire hanger” annotated on it. There is a screw with a wire attached to it. The wire supports the end of the tube. Perhaps the tube would never release from the socket, but the original device had the end of the tube forced into a foam pad for support. The wire (paperclip) provides just enough support to keep the tube in position.

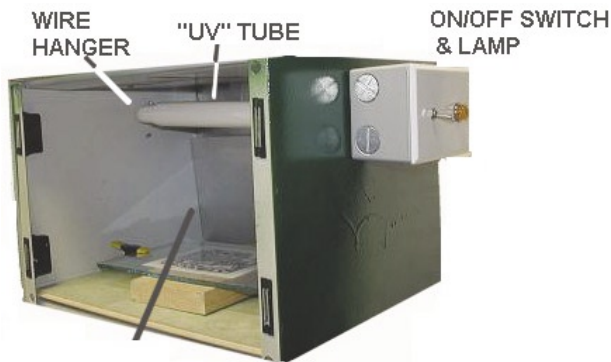
Wiring the unit is easy. The cover plate for the electrical box has an 115AC rated on/off switch and a 115 VAC neon indicator. When



**Drawing A, hole arrangement thru cabinet, mounting bracket and electrical box rear wall.**



**Wiring Schematic**



EXPOSURE CHAMBER

Photo A

the switch is in the "on" position, the lamp glows; when in the off position, the lamp is extinguished. The wiring schematic shows how minimal the circuitry is for this project.

Just be careful that the socket and wiring have ample clearance from the switch and indicator, and that the hole for the socket isn't too small for safe clearance. Don't forget a chassis ground connection and a "strain relief" for the AC cord.

### ❖ Testing, Testing...

A second check of the wiring and it's time for the "smoke" test! If all is well, a soft blue flickering light from the tube will be apparent. If

all is not well, unplug the unit and check your wiring again. If you think you've done well but it still doesn't work, reverse the leads from the tube.

The actual process of burning circuit boards and information on the required chemicals are described on the web at a number of sources, such as <http://www.thinktinker.com/stack/volumes/volvi/filmimag.htm> or <http://www.reprise.com/host/circuits/ecb.asp> and <http://www.el-exp.com> (Electronics Express catalog). Books such as the

*ARRL Handbook* (Chapter 8, 2005 edition) also describe the process in detail.

The rest of my set-up is also shown in the photograph – my "mounting table" (a block of wood), soft tipped small clamps, and two sheets of plain glass for holding the negative image and coated circuit board firmly together. It's important to use clamps or rubber bands to hold the glass assembly tight to prevent ultraviolet from "seeping" under the edges of the negative. The block of wood keeps the glass level and raises it closer to the light for greater penetration.

I used a wind-up kitchen timer for exposure times. The local home improvement store has spring wound timers with electrical contacts

which could easily be incorporated into this project. The cost, however, was in the twenty dollar range. The wimpy "ding" of my kitchen timer has been adequate for my purposes.

Making my own circuit boards has been a blast! Using an ultraviolet source and coated boards enables me to make circuit boards with fine traces that are close together. Other processes I've tried were adequate, but don't compare to the quality achieved using this process.

Total cost of this project was under twenty dollars:

Garage sale "zapper"	\$2
Hamfest enclosure	\$2
Electrical box	\$4
Switch and neon	Junk box
Aluminum flashing	\$6

Your costs could vary, depending upon availability of parts. Since I built mine, I've wondered if a discarded small microwave oven wouldn't have made a good case. It has a door with a safety switch, the "innards" could be stripped to fill the "junk box," and your initial investment would be "recycled" to another use!

**This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email [editor@monitoringtimes.com](mailto:editor@monitoringtimes.com).**

## Herding Those Rechargeable Batteries

By Alan Bosch/KO4ALA

If you are a ham and/or SWL, you probably have accumulated a good number of rechargeable AAs – nicads, nickel metal hydrides, even some lithium ions – in capacities from 450 mAH up to over 2000. Not only do they just love to roll around your work-bench or fall off into awkward places, the older you get the harder it is to remember which ones are charged up.

Well, the revolution is at hand and the mechanism is quite simple: rifle cartridge loading blocks.

They are exactly what they sound like: 4x8x1-inch-thick blocks of wood or plastic, typically with 50 holes, which shooting hobbyists use when reloading ammunition. The trick is to get the block in a caliber with a head-diameter at that will accept the various AA cells, which vary a smidge at 1/2 inch and above.

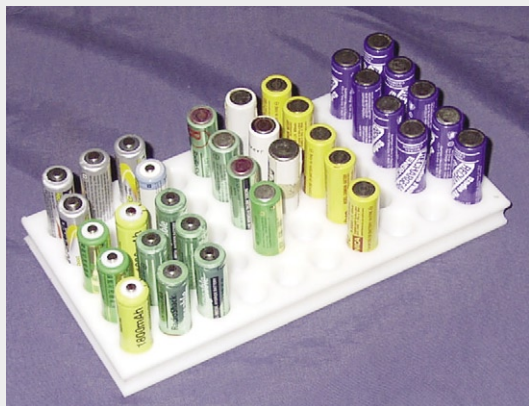
Those for classic cartridges like the .30/30 Winchester, .30-06 Springfield, and .303

Enfield come out just right – neither snug nor sloppy.

With so many holes, you can easily sort the cells by type and capacity, charged (button up) and discharged (button down), and even usage.

Prices range between about five and fifteen dollars, depending on material and finish. Cabela's <http://www.cabelas.com> and Buffalo Arms <http://www.buffaloarms.com> are two sources.

So, go get a loading block (sometimes called a loading tray) and simplify your life.

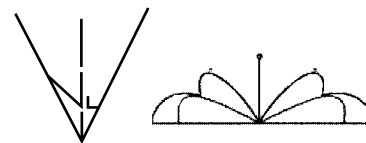


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# MT



## REVIEW

## AVCOM PSA-37XP Spectrum Analyzer

By Bob Grove W8JHD

**N**ext to a good receiver, a spectrum analyzer is the most valuable piece of test equipment that a serious monitor of the radio spectrum can own. While a receiver or scanner can monitor a single frequency, and a spectrum display unit (SDU) can reveal activity within a limited band of frequencies, only a spectrum analyzer can simultaneously provide a visual display of a broad spectrum of frequencies, instantly alerting the user to activity anywhere within its set limits.

While it's true that some new, stand-alone, wide-frequency-coverage receivers also have a "band scope" to visually reveal signals within a small chunk of spectrum, they sweep so slowly through their span that many on-off signals are missed.

Over the years, many manufacturers have produced spectrum analyzers – Tektronix, HP, Rohde and Schwarz, Advantest, B&K, Marconi, IFR and many other brands are familiar to the electronics technician. AVCOM of Virginia occupies a niche of its own, specializing in high-performance, low cost spectrum analyzers, making them particularly attractive to both the hobby radio market as well as professional

businesses and agencies operating on a limited budget.

### ❖ Spectrum Analyzers and Oscilloscopes

So how is a spectrum analyzer different from an oscilloscope? The oscilloscope operates in the "time domain" – Simply put, the left hand side of the trace on an oscilloscope is the beginning of a time interval for a specific frequency, and the right hand side is the end of that interval. The display reveals what went on during the period.

A spectrum analyzer, on the other hand, operates in the "frequency domain" – as it paints its picture from left to right, it is sweeping from a designated lowest frequency to a designated highest frequency in a span of spectrum, revealing with its trace the activity it finds during its sweep.

By narrowing the span to zero, we can home in on a specific frequency, analyzing its contents like we would do with an oscilloscope. Thus, the spectrum analyzer can function in both the time domain and in the frequency domain.

But except for a limited number of top-end spectrum analyzers, they can't be used as receivers because they don't have multimode audio detection – you can see the signal as a spike on the screen, but you can't hear it. And even among those spectrum analyzers that have audio detection, you can't simultaneously see the wide spectrum and listen to a signal.

### ❖ So Who Needs One?

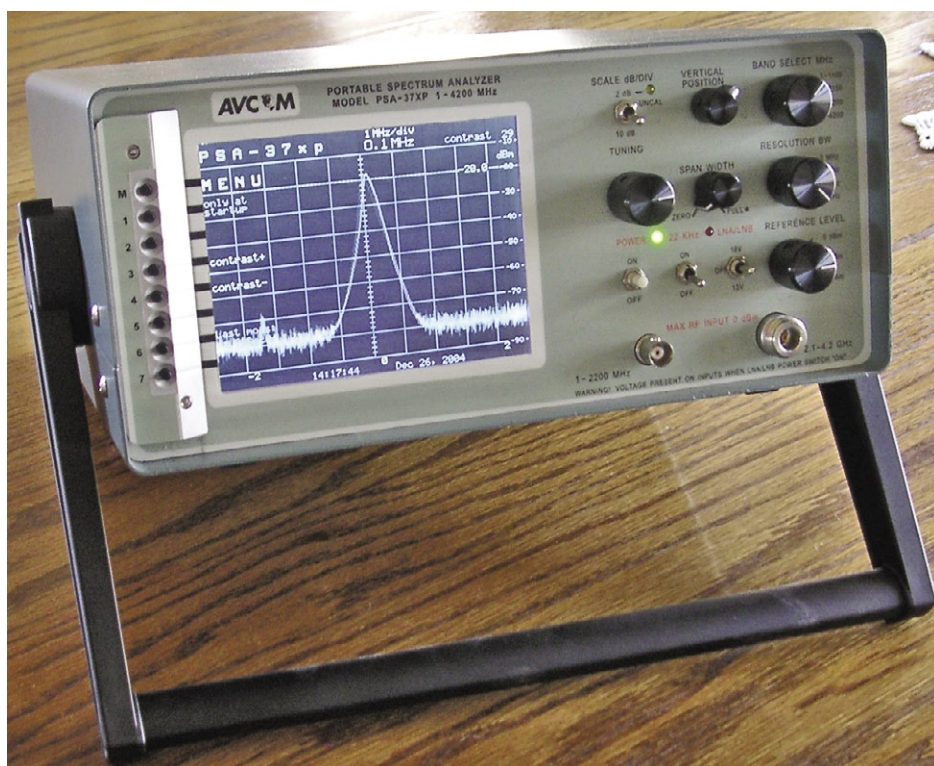
The spectrum analyzer proves itself invaluable to many sectors, to name a few: surveillance countermeasures detecting radio-frequency "bugs"; analyzing electronic prototypes for unwanted signal radiation; spectrum profiling for cell sites and communications complexes; antenna evaluation; calibrating and adjusting the radio-frequency circuitry; measuring signal levels and possible interference for wireless computer installations; aligning satellite earth station dishes; optimizing RF systems for signal-to-noise performance; viewing, locating, and identifying radio-frequency interference; and monitoring the radio spectrum for signal detection and propagation characteristics.

For wide-frequency-coverage applications, the user must select a spectrum analyzer that not only covers the amount of spectrum necessary, but which has the functions required to make necessary measurements. Let's take a look at one instrument that may qualify for the "Biggest Bang for the Buck" award.

### ❖ AVCOM's PSA-37XP

This recent release from AVCOM of Virginia has a lot going for it. As with most spectrum analyzers, it doesn't have audio recovery, but it does have everything else needed by the majority of technicians and frequency specialists, and it's perfectly suited for portable and mobile applications. The AVCOM PSA-37XP is compact (13.5"W x 5.25"H x 13"D), lightweight (10 lbs.), internal battery or externally powered, loaded with features, and has a high-definition, 5-1/4" diagonal, LCD screen for fast response and extended battery life.

Continuous frequency coverage from 1-4200 MHz (4.2 GHz) in four overlapping bands may be shown in spans of up to at least 500 MHz, or narrowed down to distinguish closely-spaced signals. Frequency range may be increased to 6000 MHz (6 GHz) with the use of an optional AVCOM MFC-4060-37



MHz microwave frequency extender.

Reference levels (sensitivity) of -40, -20 and 0 dBm are switch-selectable.

An amplitude accuracy of 2 dB is typical, with an on-screen dynamic range exceeding 65 dB.

The center, beginning and ending frequencies for any selected span are displayed on screen, with the center frequency accurate to within 100 kHz. Resolution band width (RBW – selectivity) is selectable from 75 kHz, 300 kHz, 1 MHz and 3 MHz.

While the sweep is fast enough to capture fast-burst transmissions, it's not fast enough, nor is the RBW narrow enough, to see the modulation on the skirts of the signal spike.

The agile, high-contrast, 1/4 VGA LCD is back-lit for night viewing, and shows brilliant contrast in full sunlight. The display offers user-selectable viewing choices like reverse video (white on black vs. black on white), contrast ratio, amplitude units (dBm or dBmV), sweep reversal (high/low frequencies right or left), persistence (display hold), signal peak indicator, graticules (latitude/longitude lines) on/off, signal marker, multiple trace memories, time/date display, signal alarm and more.

For satellite TV installers, toggle switches enable the BNC and N input connector to be "hot" with +13 or +18 VDC for use with an LNA or LNB; a switchable 22 kHz filter is included.

Approximately two hours of portable operation is supported by an internal lithium-ion battery; an optional second battery may be installed, extending the line-free operation. An AC power supply (included) acts

as a charger as well as powering the unit for test-bench applications.

The unit's rugged, aluminum enclosure and multi-functional bail-tilt handle invite carry-along trips where it might be needed. An optional Cordura nylon case with accessory pockets may be ordered for extra protection and convenience.

#### Computer Control

A standard DB-9 serial port is provided on the rear apron of the PSA-37XP accepts a simple serial command set to interface with a computer.

#### The Bottom Line

Our test unit performed flawlessly, provid-

ing reliable indications of local and shortwave broadcasters, two-way VHF and UHF transmitters, 2.4 GHz wireless computer links, and more. While a rudimentary instruction manual is provided, the simple layout of the control panel invites immediate, intuitive operation.

The wide frequency coverage, easy operation, versatility, portability and reasonable cost of the AVCOM PSA-37XP make it an excellent choice for the majority of technical applications requiring an RF spectrum analyzer.

The AVCOM PSA-37XP with 12V cigarette plug cord, universal 85-265 VAC power supply/charger, lithium-ion battery, and basic instruction manual are available from Grove Enterprises (1-800-438-8155; <http://www.grove-ent.com>) for \$3795 plus shipping.

#### News from Winterfest

Banquet speaker at the 2005 SWL Winter SWL Festival in March was Frans Vossen of Radio Vlaanderen Internationaal. Unfortunately Frans' voice will be disappearing from the airwaves as RVI itself loses languages and cuts services.

Sadly, it is a trend that is occurring throughout Europe. On March 4, Kim Andrew Elliott interviewed Wim Jansen, station manager of RVI Flemish World Radio and Juhani Niinistö, head of YLE Radio Finland, about reductions in European shortwave broadcasting. The interview gives further background information on Frans' subject. To close the evening on an up beat, the staff and management of the 'fest have announced the 19th 'fest is scheduled for March 3 and 4, 2006, and the big number 20 - two decades - will be on March 9 and 20, 2007! Check the Web site <http://swlfest.com/>

- Tom Sundstrom, W2XQ, Baudwalking



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# The Icom IC-746PRO as a Communications Receiver?

By Jim Clarke, NR2G

In a recent telephone conversation, the gentleman I was talking with suggested that there are a number of people who have purchased amateur radios with no intention of using anything other than the receiver. My initial reaction was to disagree, but I guess I had just never thought about that possibility. I mean, why would you buy a transceiver – the contraction of transmitter and receiver – with no intention of transmitting?

His contention was that the transceivers today are providing generous feature-sets, excellent quality, and at such a relatively low price, that you might actually get receive-features on the amateur rig that you wouldn't on a comparatively priced dedicated receiver. In light of that conversation, this month I'll take a look at an amateur radio that may very well support his contention.

The Icom 746PRO is a tabletop HF/VHF all-mode transceiver and is, according to Icom, an improved version of the 746, incorporating many of the suggestions they received from its users. Its receiver covers 30 kHz to 60 MHz, and 108 MHz to 174 MHz. The transmitter covers all amateur bands from 160 through 2 meters and includes an internal antenna tuner. As it does not have a built-in power supply, some source of 12 Vdc, power supply, or adequately rated battery, is necessary to operate the radio.

### ❖ Ergonomics

At about 5"H x 11"W x 12"L, the 746PRO is not very large; I thought the front panel was a bit cramped for a tabletop radio. Perhaps that's just my history with "large real estate" vacuum tube radio front panels talking. The LCD display, on the other hand, at 2.5"H x 3.5"W, is very generous in size. All information on the display is easy to read and logically grouped. It has a lighted whitish background with the displayed information in black. Frequency display resolution is selectable at either 10 or 1 Hz; I personally like the 1 Hz position.

Many of the front-panel buttons are multi-function, and at first, this seemed to be a hassle. But, once I learned the methodology, I

found it a rather clever way to condense as many as four functions into one button. For instance, pressing a button will toggle between two predetermined settings, but, if you hold the button down for one second, you are given the opportunity to modify the setting that is currently selected. Once changed, that now becomes one of the toggled settings.

Most of the other functions not configured using the one-second-hold method, are covered by a series of function keys corresponding to a menu displayed at the bottom of the screen. The contents of that menu changes, depending on the operating mode you have selected. Even the menu button has a group of second functions accessed using the one-second-hold method. This second menu allows customization of the more static system-level settings, such as the display's backlight and contrast.

The tuning knob is large and has a front-panel-accessible brake adjustment to achieve whatever rotational resistance is desired. The tuning finger recess has an independent rotating fingertip cup that provides smooth rotation at fast or slow speeds. The volume and tuning knobs are located on opposite sides of the display, allowing two-handed operation while tuning your favorite portion of the receive range without arm contortion or visually obstructing the display.

One feature that I really appreciated is audio tone control. The 746PRO allows you to set the bass and treble of the receive audio, something I'm not used to. This gives you the ability to compensate, to a degree, for a wide range of speakers. Yet, even with the ability to contour the audio, I still consider the internal speaker to be strictly utilitarian. An external speaker is a must to realize the

full sound potential of virtually any communications receiver.

### ❖ Keypad Tuning

The 746's keypad entry system is definitely designed with the ham radio operator in mind. The keys are marked with an amateur band frequency on the left, in white, and a number from 0 to 9 on the right, in green. Each key's primary function is to immediately change the operating frequency to the corresponding amateur band.

To enter a frequency instead of an amateur band, a key, separate from the numeric pad, must be pressed first. While I'm sure this works well for hams, I found myself repeatedly hitting one of the numeric keys in an attempt to enter a frequency, only to end up in the 40 meter band.

### ❖ IF Filtering

Your first line of defense against adjacent channel interference is IF filtering. If the filters are too wide, transmissions adjacent to your listening frequency can virtually eliminate your ability hear the desired signal. If they are too narrow, the audio fidelity is so poor that, although you have eliminated adjacent channel interference, you cannot understand the desired signal. The IF of the 746PRO uses 32bit Digital Signal Processing (DSP), which has provisions for the operator to modify, at least somewhat, the configuration of the radio's IF. Out of the box, each mode has three preprogrammed bandwidths and an associated shape. The shape of the filter is a reference to how sharp the filter's skirts are. Typically, the steeper the skirts, the better the filter.

In CW, SSB, and RTTY, it is possible to modify not only each of the default widths and shifts, but also the shape. Width adjustments are 50 to 500 Hz in 50 Hz steps for CW, 600 to 3600 Hz in 100 Hz steps for SSB, and 50 to 500 Hz in 50 Hz steps, plus 600 to 2700 Hz in 100 Hz steps for RTTY. Filter shape is either sharp or narrow, and when selected, it applies to all three filter widths for that particular mode. At any time, while in receive, the



Photo Courtesy of [www.RigPix.com](http://www.RigPix.com)

bandwidth and shift can be adjusted using the concentric Twin PBT knobs. Each of the two knobs, moved independently, can tailor the upper and/or lower cutoff frequency. If turned together, the entire passband is shifted up or down in frequency. As the IF is adjusted, there is a graphic on the LCD display to indicate the current configuration.

In FM, and unfortunately also in AM, it is not possible to modify these preprogrammed bandwidths, or shapes. The fixed widths for AM are 9, 6, and 3 kHz, with 15, 10 and 7 kHz for FM. Also, now only the inner Twin PBT knob is active, acting as an IF shift.

For all modes, returning to the preset default bandwidth and shift is as easy as the one-second-hold of a button.

### ❖ Auto-Tune/Manual-Tune Notch

Here's a feature I really like. I do a fair amount of shortwave broadcast listening, and even with the flexibility of the IF, it's sometimes necessary to eliminate a heterodyne or two. Not only can the 746PRO automatically notch out one signal, but it can do so to three or more signals, and actually track them if they move in frequency. Or, if you prefer, you can manually tune the notch for a single interfering signal. I've used the notch in both modes and found them to work beautifully.

### ❖ Multiple Antennas

If you're like me, you usually have at least two antennas for HF, one vertical and one horizontal. It's nice to be able to switch between the two depending on various conditions. The 746PRO has two antenna connections for HF and 6 meters, and one dedicated to 2 meters, all accessible on the back panel. Selection is made via a button on the front panel.

### ❖ Noise Reduction and Blanking

Icom includes two features to combat noise: a noise reducer, and noise blanker. The blanker is intended for pulse type noise, and the reducer is for hiss type noise. While these features would seem to be quite useful, I have to admit I never found a case where they really did anything. I don't think they are useless; I apparently just didn't have the type of noise they were designed for.

### ❖ Voice-Activated Squelch

Not only does the 746PRO come equipped with a signal-level squelch, but

**Table 1. Receive Sensitivity (10 dB (S+N)/N)**

Freq. MHz	Pub NP	Meas NP	Pub P1	Meas P1	Pub P2	Meas P2
0.400	ND	1.2 $\mu$ V	NA	NA	NA	NA
1.000	ND	2.0 $\mu$ V	NA	NA	NA	NA
3.000	ND	0.36 $\mu$ V	0.16 $\mu$ V	0.13 $\mu$ V	NA	0.09 $\mu$ V
6.000	ND	0.31 $\mu$ V	0.16 $\mu$ V	0.13 $\mu$ V	NA	0.09 $\mu$ V
12.000	ND	0.33 $\mu$ V	0.16 $\mu$ V	0.15 $\mu$ V	NA	0.10 $\mu$ V
18.000	ND	0.33 $\mu$ V	0.16 $\mu$ V	0.15 $\mu$ V	NA	0.10 $\mu$ V
29.990	ND	0.36 $\mu$ V	0.16 $\mu$ V	0.18 $\mu$ V	NA	0.10 $\mu$ V
54.000	ND	0.56 $\mu$ V	ND	0.22 $\mu$ V	0.13 $\mu$ V	0.14 $\mu$ V
144.000	ND	0.24 $\mu$ V	ND	NA	0.11 $\mu$ V	0.12 $\mu$ V

Pub = Published  
Meas = Measured  
P1 = PreAmp 1  
P2 = PreAmp 2  
NP = No PreAmp  
ND = No Data  
NA = Not Available

also a voice-activated squelch. I was first exposed to this type of squelch almost twenty years ago while working at a former employer. I would imagine it works the same today as it did yesterday, except today it's done in software instead of hardware.

When we did it in hardware, we split the receive audio into two separate bands using filters. If the receive audio is noise, the output from each filter will be about the same; however, if it is speech, the output from each will vary at a particular rate. Using those outputs, you open the squelch if the outputs vary, and close it if they are equal. That's a rather simplified explanation, but I think you get the idea.

Having that capability now allows you to not only squelch out background noise, but also block audio to the speaker unless it satisfies the previously explained requirements.

### ❖ Receiver Preamplifiers

There are three preamp settings in the 746PRO: two different levels of preamplification for 1.8 - 60 MHz, and one for the 108 - 174 MHz band. I found the sensitivity to be adequate without the preamp, but did find instances where the preamp was actually able to transform a marginal signal into a usable one. For sensitivity measurements, with and without the preamp, see Table 1.

### ❖ Other Features

Unfortunately, space limits me from highlighting all of the receive features, such as scanning, memories, computer-control, and display of decoded RTTY signals, among others.

### ❖ How Does It Play?

As we all know, "the proof is in the pudding," so I hooked up my 200-foot end-fed longwire and proceeded to make the rounds. I stopped just long enough in each shortwave broadcast band to see if I could find a receive situation that would require multiple features to render the desired signal readable. In one case - of which I didn't

note the frequency or station ID - the desired signal was completely unreadable and, at times, undetectable. With the combination of the notch and IF-shifted narrow filter, the 746PRO had no problem pulling the signal up out of the mud.

To me, that's the bottom line. A radio can have all kinds of bells and whistles, but if it doesn't deliver you a readable signal from one that is otherwise unreadable, it is a waste of time, money, and front-panel real estate.

### ❖ Final Thoughts

Suggested retail is \$2265.33, but the usual street price is around \$1750. With Icom's current \$200 coupon offer, that brings it down around \$1550.

Suffice it to say, the 746PRO certainly provides a number of features that are not common on many communications receivers. I thoroughly enjoyed operating it for this review, and, in fact, didn't really want to send it back. This is truly a fine radio for the money!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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## Old DOS Radio Programs – Still Useful?

Having been in the business longer than I care to remember, I have been involved in many technology development projects – from full-blown communications systems to systems-on-chip – from software to run a product, to software that *is* the product. I have managed, witnessed and participated in the huge human effort and sacrifice required to bring a new technology product to market.

During my career I have also worked in other non-technical industries. Therefore, I can say factually that people who have not worked in technology cannot imagine the level of dedication, effort and sacrifice that goes into many revolutionary technical product developments. It would surprise most people if they knew the hundreds or thousands of “people hours” that goes into such a technical development. Many times this is at the expense of personal and family life. Yet, it is a sad fact that after all this personal effort and sacrifice, most technology products will be obsolete within eighteen months...if they make it at all!

Perhaps this is why it is so hard for me to throw out-dated tech products into the trash. But, lack of space and promoting domestic tranquility demands it. So, as I was emptying out boxes of software collected over the past twenty-five years, I had the feeling that I was discarding all the personal effort that had gone into these products. I looked at my hundreds of disks and CDs of all shapes and sizes, from many different computer systems, from many different PC operating systems, all heading for oblivion at the dump. What a waste of decades of human effort! Could there really be no value left in these vintage programs? These were the feelings that stimulated this month's column.

Before pitching the 5.25 inch DOS radio program disks into the dumpster, I decided to give each of them one more try. Just reading the names brought back memories of another time when Scancat and ScanStar were the only receiver control and logging programs in the world! (As we walk down memory lane, please do me a favor: Hold your letters to MT telling them who really made the first logging program on their abacus or whose is the best. A product's longevity and place in technology isn't dependent upon who yells the loudest.)

The late 1980s/early 1990s was a time when very little hobby radio software was available. Military radio communications software was almost entering its third decade, but other markets did not see its usefulness. The early open-market radio software pioneers of this era had to have been visionaries, crazy, or both to develop products with

such little market demand.

These early programs were designed for operation on MS-DOS (Microsoft Disk Operating System). Let's take a quick look at some and see if they still work on today's Pentium computers running Windows 98.

### Lots of Change

Computers and their operating systems have changed since many of these vintage radio programs were produced. In addition, the fragile storage 5.25-inch disk format has disappeared. My first task was finding and then installing a 5.25-inch disk drive in my 1GHz Pentium III running under Windows 98SE.

Finding the drive took a week. But installation via the BIOS screen was a few minutes. The drive had been idle for so long that the read head was stuck in one spot on its rails. After disassembly and a light application of petroleum jelly to the rails, the drive worked perfectly.

### DOS in Windows?

Can a DOS program run under the Windows operating system? To answer this question a number of factors have to be considered. If the program was written using specific hardware address, say for an XT (remember those?), or a specific early DOS version, then it may be an insurmountable problem.

If, on the other hand, the problem is caused by the program not wanting to share resources with Windows or requiring specific entries in the *Autoexec.bat* or *Config.sys* files, then we may have a method to satisfy the program's needs. The problems encountered may be simply solved or may be so complex that it's not worth the effort. We will cover some of the simpler methods.

A useful key combo is “Alt” and “Enter” simultaneously. If a full screen DOS program freezes, you can sometimes bring Windows back by minimizing the DOS window with this keystroke.

### Read! Read! READ!

First read the installation instructions that came with the program. You should also check the disk to see if there is a “Re-

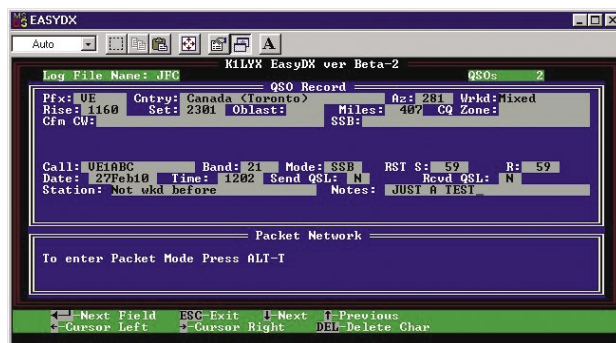


Figure 1 EasyDX circa 1988

adme” or “Read 1<sup>st</sup>” file that might also give you installation and DOS requirement details. Carefully follow the installation instructions. If none are available, cross your fingers and try clicking on the main program file, usually ending in “exe”.

No luck? If this doesn't work, copy all the files to a new folder on your hard drive and repeat the procedure. No joy? Then read on.

### Approach 1 -KISS

Go to the Windows “Start” tab at the bottom left of your desktop screen. Choose “Programs” and then run “MS-DOS Prompt”. To make it quicker, I made a shortcut to the MS-DOS Prompt on my desktop. Once in DOS, if you can remember how, navigate to the folder and then type the program name.

Most of the radio programs we will look at later ran using this simple method. However, I found that following installation instructions exactly contributed greatly to success.

If this simple method does not work, then try Approach 2.

### Approach 2 -Right Clicking

Start by finding the main program file in your installed or copied folder. Right click on

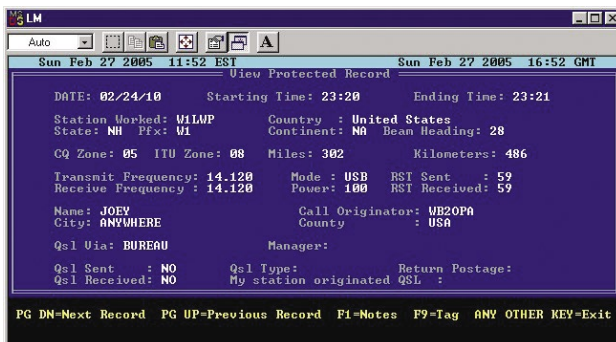
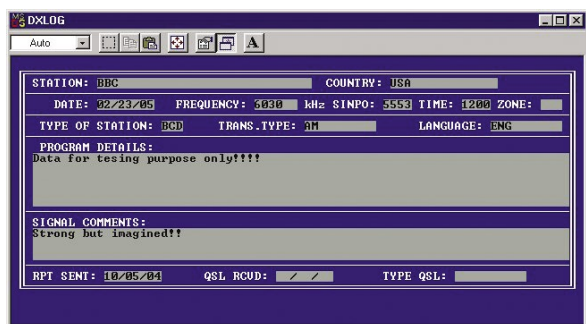


Figure 2 LogMaster – With lots of features and still very useful



**Figure 3 Shortwave DX Log – This one is a keeper for 21<sup>st</sup> century SWLers**

this program to bring up a list. Then left click on “Properties” at the bottom of the list opening the program’s properties window. Select the “Program” tab at the top left of the pop-up window.

Now left click on “Advanced” button near the bottom of the window. This will bring up yet another (now you know why it’s called Windows) window, Advanced Program Settings.

The first two boxes at the top of this window can be selected together or separately. This yields three possible combinations (box 1 or box 2 or box 1 and 2). We will not use the third box for this approach. Select one of the three combinations. Then click “OK” then “Apply” on the next screen.

Now, try running the DOS program using the methods in Approach 1 (above). If the program does not work, repeat the procedure choosing the next box 1 and 2 combination until the program runs.

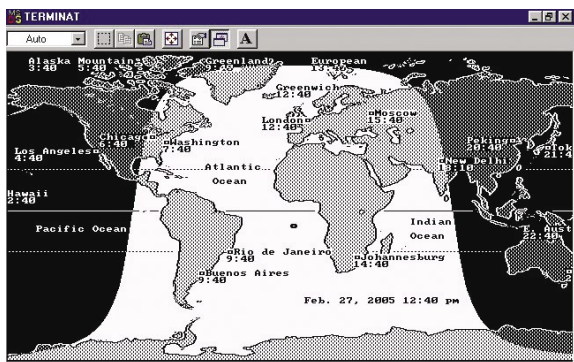
If no combination is successful, then go to the next approach below.

### Approach 3 – Last Try

Using the method outlined in Approach 2, open the “Advance Programs Settings” window. However, this time click box 3, “MS-DOS mode”. Choosing this box will force your system to reboot in the MS-DOS mode when you try running this DOS program.

Before you leave this window, take another look at the program’s instructions. If the program requires special lines in the Autoexec.bat or Config.sys files, this is where we will enter them.

For example, the program may require that a line “Files=20” be added in the Config.sys file. After selecting MS-DOS Mode, select “Specify a new MS-DOS configuration”. Then add the exact line requirements, as detailed in the program’s instructions, into the appropriate box. Select-



**Figure 4 Terminat – A grey line program showing the terminator line separating the areas of the Earth in sunlight and darkness**

ing “Configuration” will give you automatic choices that may fit the program’s requirements. Check it against the program’s instructions.

These new startup parameters will only be called on when a DOS program boots up your computer and should not effect the operation of your Windows-based programs. However, I can give you no guarantees. I do most of my radio work on a computer that is just for trying new programs. All of my important information is stored on another computer ...just in case.

When you are done, left click “OK” then “Apply”. Now, with fingers crossed, try running the program.

Here are some of the programs, over twelve years old, that still worked and have value to radio monitors.

### ❖ DX-AID

Version 3.0 is dated 1991 and written by P. Oldfield. This is a simple but very useful propagation, distance, and bearing program. It provides simple maps and propagation forecasts. It even has a predicted sun spot number for the future. Of course, the chart starts in 1991 and ends in 1999! How quick the future becomes the past...

DX-AID runs best from the DOS prompt. The program is very well behaved and works just by left clicking *Dxaid.exe*. DX is good effort that still can be enjoyed and provides a useful function for SWLers.

### ❖ EasyDX

This logging program is dated 1988 by Glen-don R. Whitehouse. Geared to hams, it automatically inserts country, bearing, and distance based on the “worked” ham call sign and the user’s data. See Figure 1. It has TNC (terminal node controller) capabilities for interfacing to something like the AEA PK-232. It prints log sheets and labels for QSL cards. It’s well behaved under Windows and easy to use.

### ❖ LogMaster

One of the brave, do-it-all radio originals dating from 1989 by WB2OPA. I tried Version 4.07 from 1991. Don’t be fooled by its name – this program does a great job of logging but also does rig control of most ICOM radios, if you know the two-digit ICOM address. It also manages decoded data from a TNC. And the good news is that it operates flawlessly under Windows 98SE.

### ❖ Shortwave DX-LOG

It does just what it says. It is a great, simple shortwave logging program. The data can be presented on screen or to a printer in a number of different and useful formats. Shortwave DX-LOG was created in 1991, long before Windows 95 was released in its first bug-ridden form. However,

Shortwave DX-LOG runs smooth and fast under Windows 98SE just by clicking the *Dxlog.exe* file.

### ❖ SWL Logger

Here is another simple to use, but very useful program rescued from the trash! Written in 1991 by Charles A. Pitts, WB1CCF, version 1.1 does basic logging and data sorting. The log info is basic, including station, frequency, language, date, time and QSL info. As a member of the “one-click club,” it works fast and is a pleasure to use under Windows 98SE.

### ❖ QSO Logging Facility

This 1991 logging program, written by Sanford R. Smith (WJ1I) and Ross Rogers, has some nice features, such as automatic insertion of date and time. It has seventeen different fields of information in each record. The Comments section is a bit small with a maximum of 48 characters.

Beware. It has a problem if you input frequency data in megahertz or outside of the ham bands. A screen comes up to say that it must be in kHz and within certain ranges. But then the program crashes. I did not try to see if the problem existed under the boot-up DOS mode.

Except for this one problem, it runs well and gives an excellent screen presentation.

### ❖ Terminat

A fitting name to our last program this time, which dates back eighteen years to 1987. Just think of the changes that have taken place in the world and technology since this program was written! One thing that is still constant is the rotation and revolution of the earth. Good thing for Terminat, which gives an accurate, real-time, full screen monochrome display of the Earth showing the areas in sunlight and darkness.

Terminat gets its name from the line that divides the light from the dark regions. Only problem is that it thinks that the time on your computer clock is GMT. A quick change of the computer clock with a right click on the date at the lower right of your screen does the trick. Don’t forget to reset it to local time or your file saved times will be off. Terminat is also a member of the “one click club.”

### ❖ Next Time

As we have seen, of the hundreds of vintage program that I had, some deserve to live on in the software collection. The efforts of their creators was not wasted.

Next time, we’ll try a few more vintage DOS programs, including some of the early big names. Many were rightfully grabbed from the teeth of destruction, and others deserved the big dumpster.

Try “Google-ing” some of the programs we looked at this month. You may find a newer Windows version now exists. Email me with your favorite radio oldie programs that still work under Windows (98 or XP). The program must be at least twelve years old to qualify for the title of “vintage”! Remember, *old* is not synonymous with *useless*. Till next time.

# What's NEW

## Tell them you saw it in Monitoring Times

### Easy PSK

Joining in the fun on PSK is easier than ever using Saratoga Amateur Radio's new EZ-PSK USB transceiver to sound card interface, which puts rig control and digital mode operation into one box. The EZ-PSK USB utilizes the computer's USB port for the Push-to-Talk (PTT) function and to provide rig control.



The EZ-PSK works with all sound card applications and all digital modes. The EZ-PSK has no jumpers to set; simply plug it in, load your favorite software and begin to operate on digital modes. Using no external power makes it ideal for portable operation.

Versions are available for Icom, Yaesu and Kenwood transceivers. Ten-Tec is available on request. The EZ-PSK ships with a CD containing a selection of software.

The EZ-PSK USB has suggested retail price of \$75.95 and is widely available at ham radio stores including Ham Radio Outlet. For a dealer near you visit <http://www.saratogaham.com> or call 888-676-4426.

### South Florida Guide

When I got my first programmable scanner (a Bearcat BC-210), I could punch in any frequency the scanner covered, instead of buying a crystal. When some hobbyists published a local scanner guide to the San Diego area, I had to have that book at any price. In my experience, scanners and local frequency guides always go hand in hand, and I've owned a lot of both since then!

Recently, we received the new 9<sup>th</sup> edition of the *South Florida Frequency and Trunking Guide* and the quality exceeds any of the old guides that I used many years ago. Published by noted scanner hobbyist Brian "Scanner Dude" Cathcart

KE4PMJ, this book contains just about anything you need to know about public safety radio systems in four southern Florida counties.

The *Guide's* primary coverage area includes all county and city agencies in Miami-Dade, Broward, Palm Beach and Martin counties. There are additional chapters detailing the current status of the State of Florida trunk system (including frequencies and trunk system IDs), the Florida Power and Light 900 MHz trunk system, and the three major airports in the area.

Detailed information on each of the agencies covered in this book includes receive and transmit frequencies, complete channel descriptions, CTCSS codes, FCC callsigns, unit numbers, station locations, coverage maps and much more.

Chapter Seven is particularly useful with two cross-reference lists: a by-frequency list of all frequencies in the book and a useful list of all the trunk system identifications (talk-group IDs) organized by ID. The book wraps up with a chapter on Florida scanner law and a glossary of radio terms, lingo and acronyms commonly heard on the South Florida public safety airwaves.

Whether you are a resident of Southeast Florida or just a visitor, this book is what you need to completely monitor public safety systems in the area. The *Guide* is available in either printed or CD-ROM format. The printed format is a 212-page, comb-bound book with black and white pages. The CD-ROM format includes the entire book in Adobe Acrobat PDF format with most of the maps and graphics in color.

The cost is \$25.00 for each book or CD-ROM, shipping included. Or, buy the book and the CD together for only \$35.00 (including shipping). Checks and money orders should be made out to Brian Cathcart and sent to: 4050 Edgewood Drive, Coconut Creek, FL 33066-1835. Brian also

accepts payment via PayPal to his user ID: [scannerdude@juno.com](mailto:scannerdude@juno.com). Additional information is available at <http://www.scannerdude.com> — Larry Van Horn, N5FPW

### Southern California Directory

"We pick up where others left off," is the mantra of a new scanner frequency directory published by Scannerstuff and editor Dan Rollman. The *Southern California Frequency Directory (SCFD)* is a massive 448-page, 8-1/2-inch by 5-1/2-inch scanner guide to California's Southland.

The opening sections of the book includes several scanner user guides that go beyond "where to tune" to provide information about what you are hearing. In addition to listeners' guides to scanners, trunking and aircraft monitoring, there are sections on terms and abbreviations, fire, Sky Warn, NOAA weather radio, wildland fires, public safety aircraft, and California State and the federal government.

The rest of the book is organized alphabetically by county. The *SCFD* includes information on amateur radio, police, fire, medical, aircraft, schools, hotels, utilities, malls, media, government (local, county, state and federal), recreation and much more, with frequencies, channel numbers and usage, PL (CTCSS) tones, callsigns and more.

Also included are trunked radio frequencies, talkgroups and system information, maps of police precincts, fire station locations, and other agency background information.

Counties featured in the book include: Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties. There is even a special section at the end of the book devoted to railroad systems in the Southland area. Whether you are

new to scanning or an oldtimer, there is a lot of meat here to chew on.

In addition to this new southern California book, Scannerstuff has also published scanner guides for Arizona (*Southwest Frequency Guide*); the Atlanta, Georgia area; and the *Northwest Frequency Guide* (Oregon/Washington).

The *Southern California Frequency Guide* is priced at \$24.99 plus shipping and can be ordered on their website: <http://www.scannerstuff.com/>. The book is also available at Ham Radio Outlet stores in Burbank, Anaheim and San Diego. The *Southern California Frequency Directory* truly picks up where the others leave off.

— Larry Van Horn, N5FPW

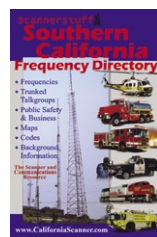
### The Australasian Shortwave Guide

The *Australasian Shortwave Guide* is a non-commercial publication, issued twice a year for over ten years. With many international broadcasters no longer providing schedules to their listeners, the *ASWG* is more essential than ever.

Edition 19 covers the period March 27 to October 31, 2005 (A05), and includes over 1400 entries in 40 pages. Comprehensive schedules are provided for: broadcasts in English to Australia, Asia, the Far East, the Indian sub-continent and the Pacific, and broadcasts in ALL languages to Australia and the Pacific.

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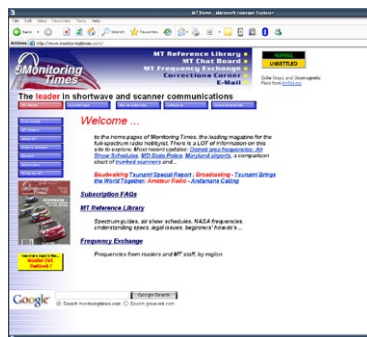
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